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20070307

DELTA DOP Series HMI User Manual

DELTA ELECTRONICS, INC.

DOP Series HMI User Manual



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Preface

Thank you very much for purchasing DELTA's DOP-A Series, DOP-AE Series and DOP-AS series Human Machine Interface (hereinafter "HMI") products.

This manual will be helpful in the installation, operation and specifications of Delta HMI product and HMI Screen Editor software program (hereinafter "ScrEdit"). Before using the product, please read this user manual to ensure correct use.

You should thoroughly understand all safety precautions (DANGERS, WARNINGS and STOPS) before proceeding with the installation, wiring and operation. If you do not understand please contact your local Delta sales representative. Place this user manual in a safe location for future reference.

🕮 Using This Manual

■ Contents of this manual

- This manual is a user guide that provides the information on how to install and operate Delta HMI products and ScrEdit.

■ Who should use this manual

This user manual is intended for the following users:

- Those who are responsible for designing.
- Those who are responsible for installing or wiring.
- Those who are responsible for operating or programming.

■ Important precautions

Before using the product, please read this user manual thoroughly to ensure correct use and store this manual in a safe and handy place for quick reference whenever necessary. Besides, please observe the following precautions:

- Install the product in a clean and dry location free from corrosive and inflammable gases or liquids.
- Ensure that HMI is correctly connected to a ground. The grounding method must comply with the electrical standard of the country.
- Do not modify or remove wiring when power is applied to HMI.
- Before starting the operation, make sure the emergency stop equipment can be energized and work at any time.
- Do not touch the power supply during operation. Otherwise, it may cause electric shock.

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About this Manual…

User Information

Be sure to store this manual in a safe place.

Due to constantly growing product range, technical improvement and alteration or changed texts, figures and diagrams, we reserve the right of this manual contained information change without prior notice.

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Chapter 1 Introduction

1.1 DOP Series Human Machine Interface

DOP series HMI are manufactured by adopting high-speed hardware to provide you with a powerful programmable interface. ScrEdit software is a user-friendly program editor of DOP-A, DOP-AE and DOP-AS series HMI for Windows. Please refer to the following section for its features and function introduction.

1.2 Features

- **PLC Serial Drives Support**

 DOP series HMI's support more than twenty brands of PLC's, including Delta, Omron, Siemens, Mitsubishi, etc. All of the newly supported PLC's communication protocol information could be found on our website (http://www.delta.com.tw/industrialautomation/) for upgrade to meet your requirements. (All other trademarks in this manual are property of their respective companies.)

- **Windows® Fonts Support for ScrEdit Software**

 Except Simplified Chinese, traditional Chinese and English languages, ScrEdit software also provides those fonts that Windows® uses.

- **Quick Execution and Communication Macro**

 It can handle complicated calculation by executing macro. The user can also write communication protocol with communication macro command to connect specific system via COM port.

- **Rapid USB Upload/Download**

 It will shorten upload/download time by using USB Ver1.1.

- **Recipes**

 It provides useful recipe editor that is similar to Microsoft excel for user to edit recipe easily and input multiple recipes simultaneously (size limit is 64K). When downloading multiple recipes at the same time, it can exchange by internal memory of HMI. If data has finished editing when downloading, you can download recipe individually.

- **Direct Communication with Two or Three PLCs**

 DOP-A series HMI is able to connect to two different or the same controllers via two communication ports. Up to three communication ports are provided in DOP-AE and DOP-AS series HMI for direction connection to PLCs.

- **Support Multiple PLC's Connections**

 One DOP series HMI can connect to multiple controllers in serial through COM2 of RS-485 port (NOTE 1).

- **Simulation Function (NOTE 2)**

 HMI ScrEdit software provides simulation feature which allows the user to develop and debug software on the PC connected to DOP series HMI before downloading it to DOP series HMI.

 Off-line Simulation: When the editing and compile operation is completed, the user can use off-line simulation function to simulate HMI operation and check if it is correct or not through the PC directly without connecting to the controller.

 On-line Simulation: When the editing and compile operation is completed, the user can use on-line simulation function to simulate HMI operation and check if it is correct or not through the PC directly with connecting to the controller.

- **Using SM Card to Backup Data**

 SM card can also be used to backup data or transfer data to another HMI. After data transmission, the data can be saved into the FLASH memory of HMI. History list and alarm message can be also saved in SM card and the user can read these files by card reader for collecting data and printing.

- **Multiple Security Protection**

 It provides passwords to protect designer's intellectual property rights and also for the user to set the user's priority for important components. Only the user, whose priority is higher than the component, can use the component.

- **USB Host Port (USB Host) Equipped**

 Parts of DOP series HMIs have a built-in USB Host interface for the connection to USB flash drive, card reader and printer with USB socket. The user can save data, copy program and print the screen immediately and increase the data storage space.

- **Multiple Security Protection**

 It provides passwords to protect designer's intellectual property rights and also for user to set user priority for important component.

- **Multi-Language Support**

 It is easy for the user to switch the desired language via HMI or the external controller. Furthermore, Unicode editing is supported, and therefore it is convenient for the user to create and edit more quickly.

NOTE

1) The controller should provide RS-485 interface.
2) Off-line/On-line simulation functions are only provided for some parts of the controllers. Also, the execution time of on-line simulation only can continue 30 minutes. After the simulation time has finished, HMI will return ScrEdit software main screen from simulation window automatically.
3) When executing simulation function, the resolution of PC screen should be set to 24bit and higher, otherwise the simulation function may work abnormally.

1.3 Ordering Information

DOP	–	AE	10	TH	T	D	–	W
1		2	3	4	5	6		7

1. Product Name	Delta Operation Panel
2. Series	AS: USB Client, USB Host, COM Port x 3 A: USB Client, COM Port x 2 AE: USB Client, USB Host, COM Port x 3, Extension Port
3. Panel Size	38: 3.8 inches 57: 5.7 inches 75: 7.5 inches 80: 8 inches 94: 9.4 inches 10: 10.4 inches
4. Panel Color and Type	BS: Blue/White 16 Grays STN GS: Black/White 16 Grays FSTN CS: 256 Colors STN TC: 256 Colors TFT TH: 65536 Colors TFT
5. Interface Type	T: Touch Panel
6. Input Power	D: DC +24V
7. Case Color	None: Gray W: White (currently be provided for AS38, A57 and AE57 models only)

1.4 Caution

- **Operation Environment (temperature and humidity)**

 HMI should be operated in the following environment parameters to adjust screen brightness and contrast to get the best image. If operating out of the range, LCD may be improperly displayed when using for long time.

 Ambient Operating Temperature: 0 ºC to 50 ºC (32 ºF to 122 ºF)

 Relative Humidity: 10% ~ 90%, no condensation allowed

- **SM Card**

 SM card can be used to save and transmit data. Only SM card that formatted by HMI can be used on both HMI and Windows® OS system. (Even it can be read/written in some format, but faults may occur due to different format among Win95/98/2000/XP versions)

- **USB Flash Drive**

 USB flash drive can be used to save data. It also can be used to copy data from HMI and its format is FAT32. When using USB flash drive to save data, we recommend the user should enter system screen first and then remove the USB flash drive. Follow this process can ensure that the data is saved completely in USB flash drive.

Chapter 2 Creating and Editing Screens

2.1 ScrEdit (Screen Editor) Setup

In this chapter, it will introduce general functions of Screen Editor with Windows. The user can use it to design what he wants. Detail information for each function will be discussed in following chapters.

■ Minimum System Requirement

Below are the system requirements to comply with the operation environment of ScrEdit:

Item	System Requirement
CPU	Pentium III, 500MHz or greater is recommended
Memory	256MB and above is recommended
Hard Disk	Capacity: 400MB and above
Monitor	Support resolution: 800 × 600 or higher full-color display.
Printer	Printer compatible with Windows® 2000 & Windows® XP
Operation System	Windows® 2000 & Windows® XP

■ Software installation

The user can download the Screen Editor, the program editor of Delta HMI product via the link below: http://www.delta.com.tw/product/em/hmi/hmi_software.asp.

To start the Delta HMI ScrEdit setup, please refer to the following steps:

1. Step 1: Please start-up your computer to Win2000/WinXP system (Fig. 2.1.1).

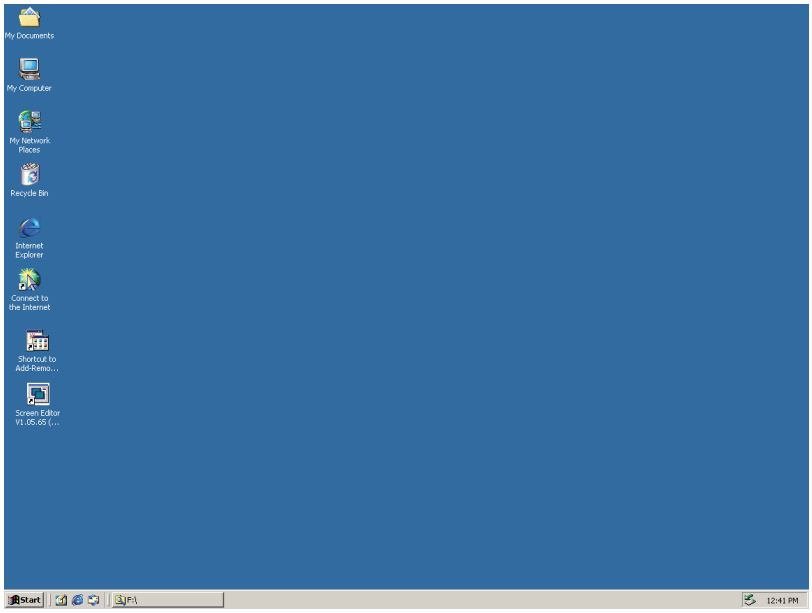


Fig. 2.1.1 Open Microsoft Windows

2. Step 2: Execute **setup.exe** from Windows taskbar by clicking **"Start" > "Run"**. 3. After pressing **OK**, system will setup automatically and you will get the following dialog box to select the desired display language (Fig. 2.1.2).

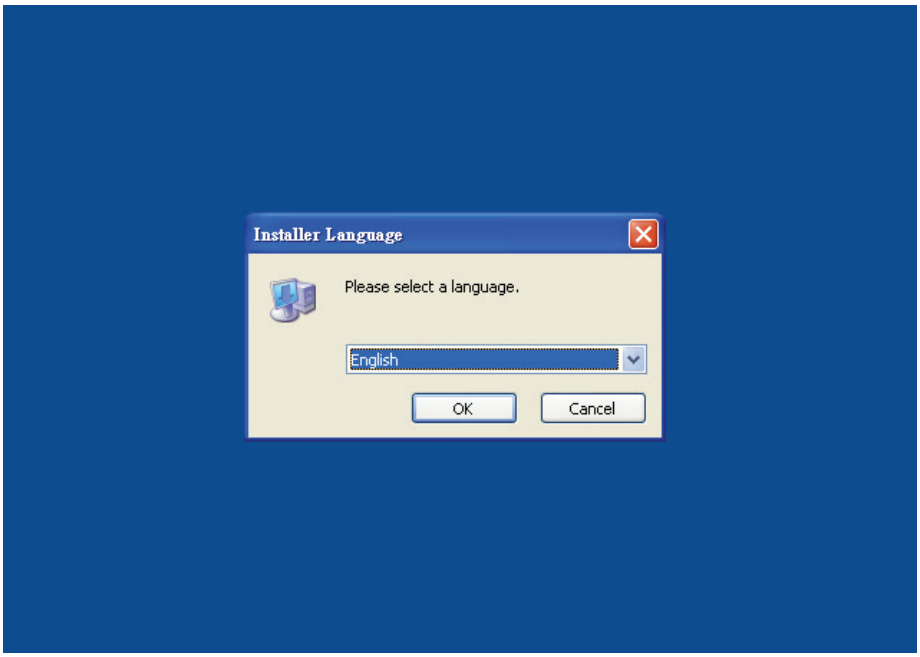


Fig. 2.1.2 Select Language

After pressing **OK**, system will setup automatically and you will get the following dialog box to choose destination location (Fig. 2.1.3).

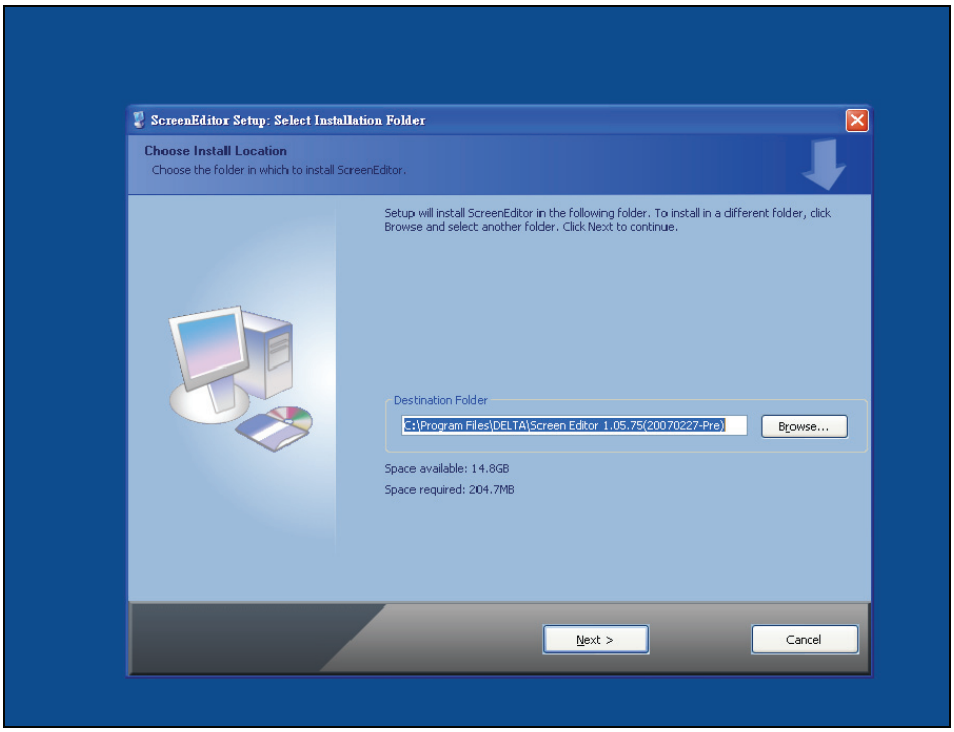


Fig. 2.1.3 Directory for installing ScrEdit

To select the default directory **C: \Program File\Delta\Screen Editor 1.05.XX**, click **Next>** for the next step. Setup will install in the directory indicated in the Destination Directory box at the bottom of the dialog box.

To select a directory other than the default directory, click **Browse**. A list of available directories appears. Highlight the desired directory for the Delta HMI ScrEdit and click **OK**, then **Next>** for the next step.

If necessary, click **< Back** button to take you back through Setup dialog boxes one by one.

3. Step 3: After pressing **Next**, system will ask you to select the installation software, i.e. ScrEdit (Fig. 2.1.4).

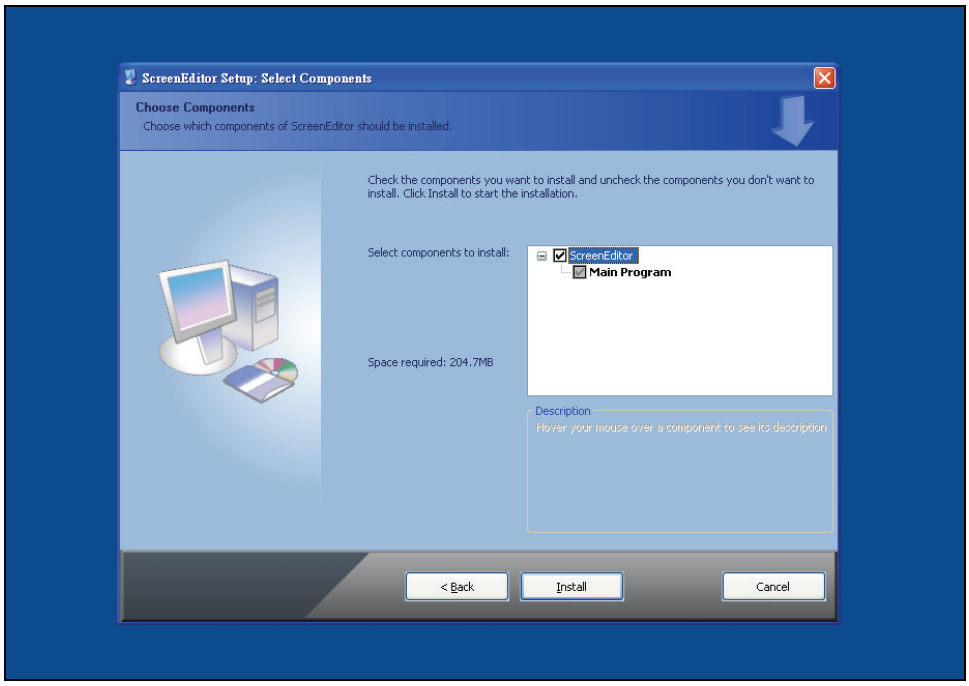


Fig. 2.1.4 Select ScrEdit

4. Step 4: Then click **Install** button to start ScrEdit installation (Fig. 2.1.5).

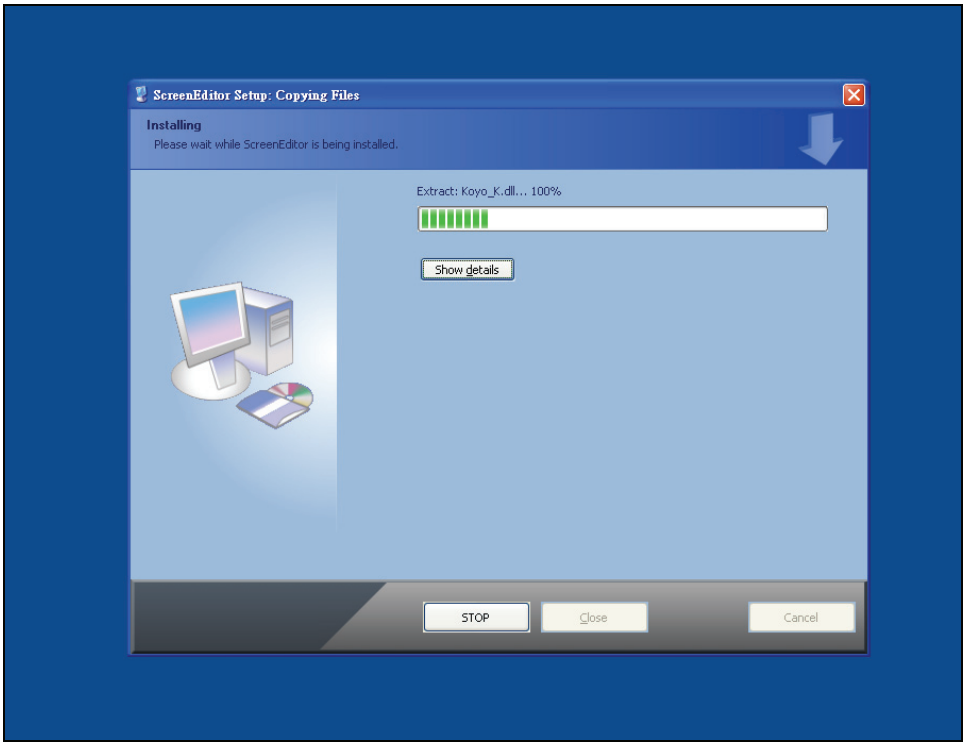


Fig. 2.1.5 Starting ScrEdit installation

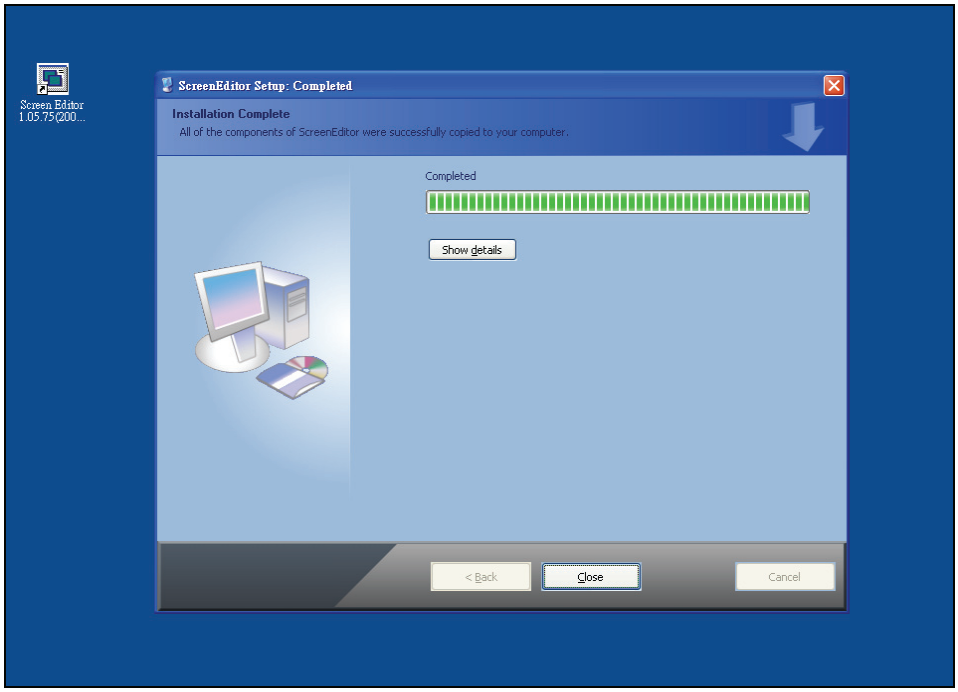


Fig. 2.1.6 Finish installing ScrEdit

5. Step 5: After finish installing ScrEdit (Fig. 2.1.6), system will ask you to install HMI USB driver, please click **Yes** to install.

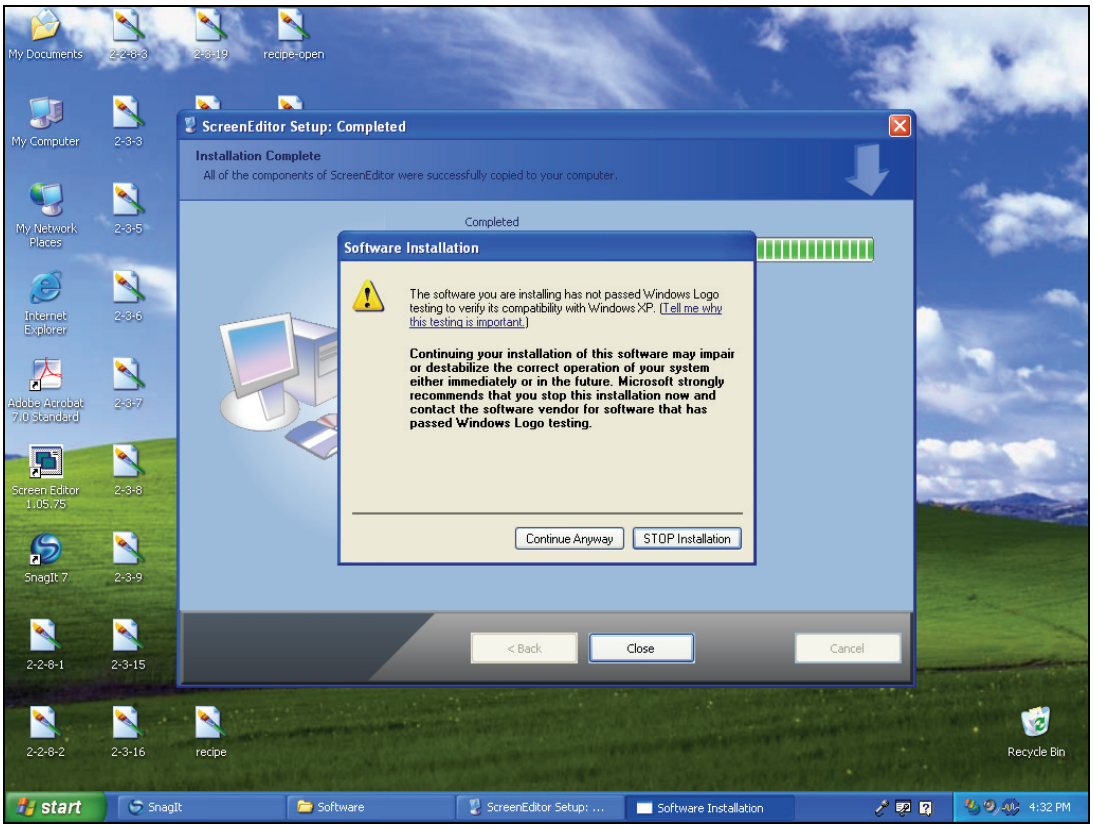


Fig. 2.1.7 Install HMI USB driver

6. Step 6: After installing HMI USB driver, click **Close** to complete the installation.

2.2 How to Start ScrEdit

1. After setup, you can start ScrEdit by clicking **Screen Editor 1.05.XX** shortcut on the desk (Refer to Fig. 2.2.1) or from Windows taskbar, click **Start > Programs > Delta > Screen Editor 1.05.XX**.



Fig. 2.2.1

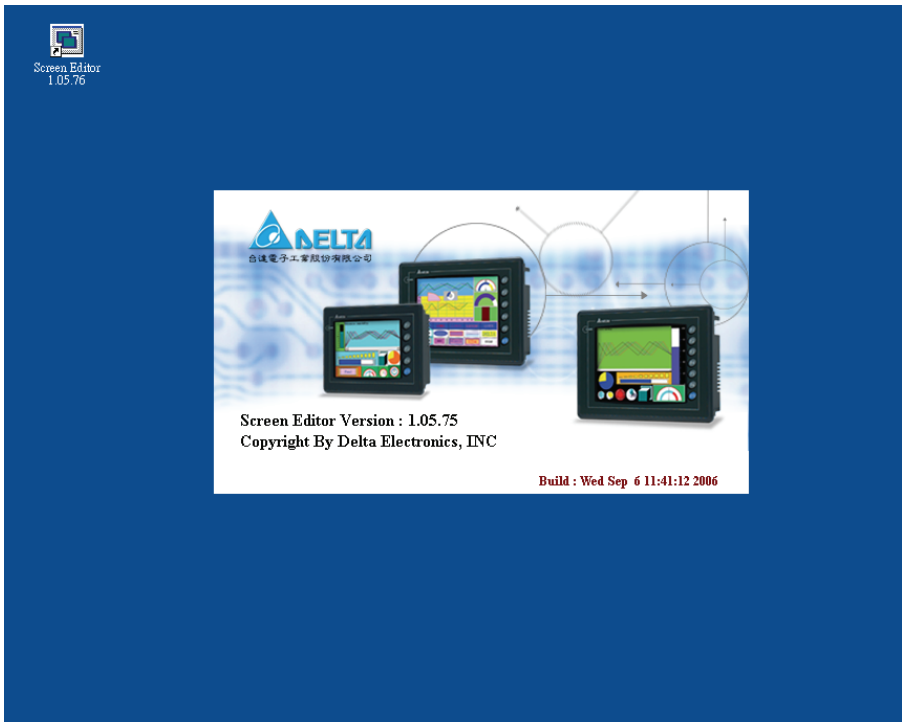


Fig. 2.2.2 Start-up display

When ScrEdit is activated for the first time, the first window to show up is as follows. There are only File (F), View(V), Option(O) and Help(H) on the toolbar.

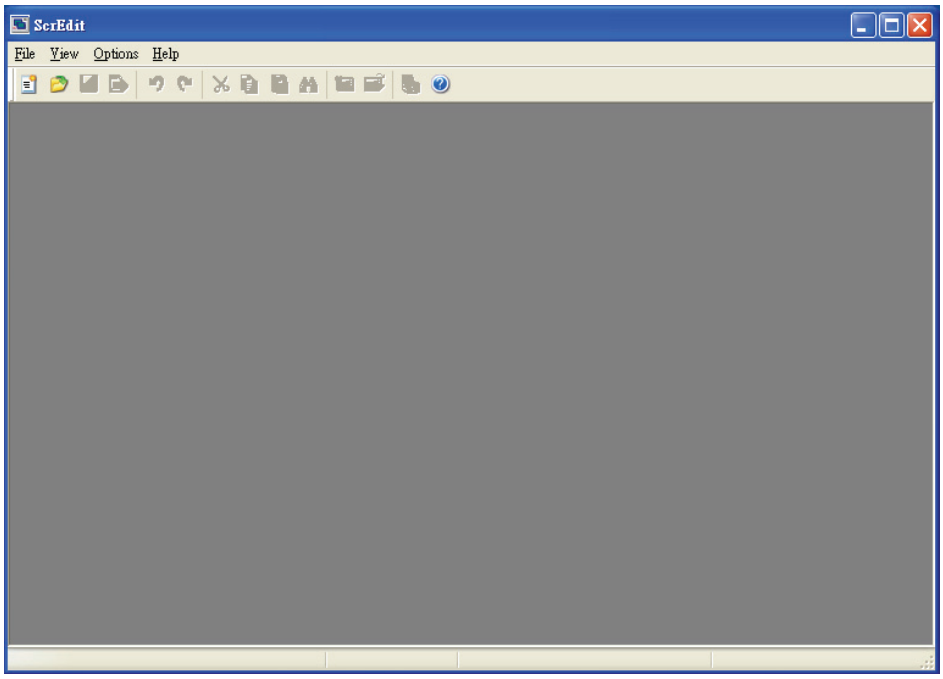


Fig. 2.2.3 Screen without editing file

2. After pressing  or click **File** > **New**, it can create a new project and you will get a dialog box as shown in the following. (Fig. 2.2.4)

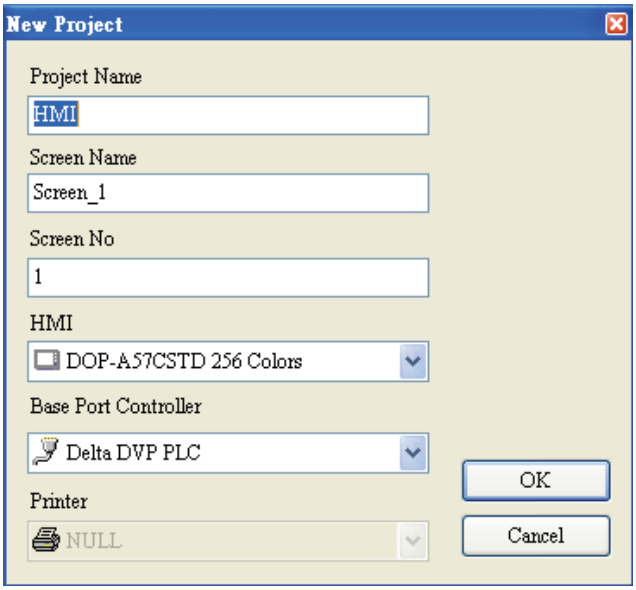


Fig. 2.2.4 Creating a New project

3. Enter the Project Name, Screen Name, Screen No. and select connected HMI, controller or printer. Then, click **OK**. It can create a new project in ScrEdit as shown in the following. (Fig. 2.2.5)

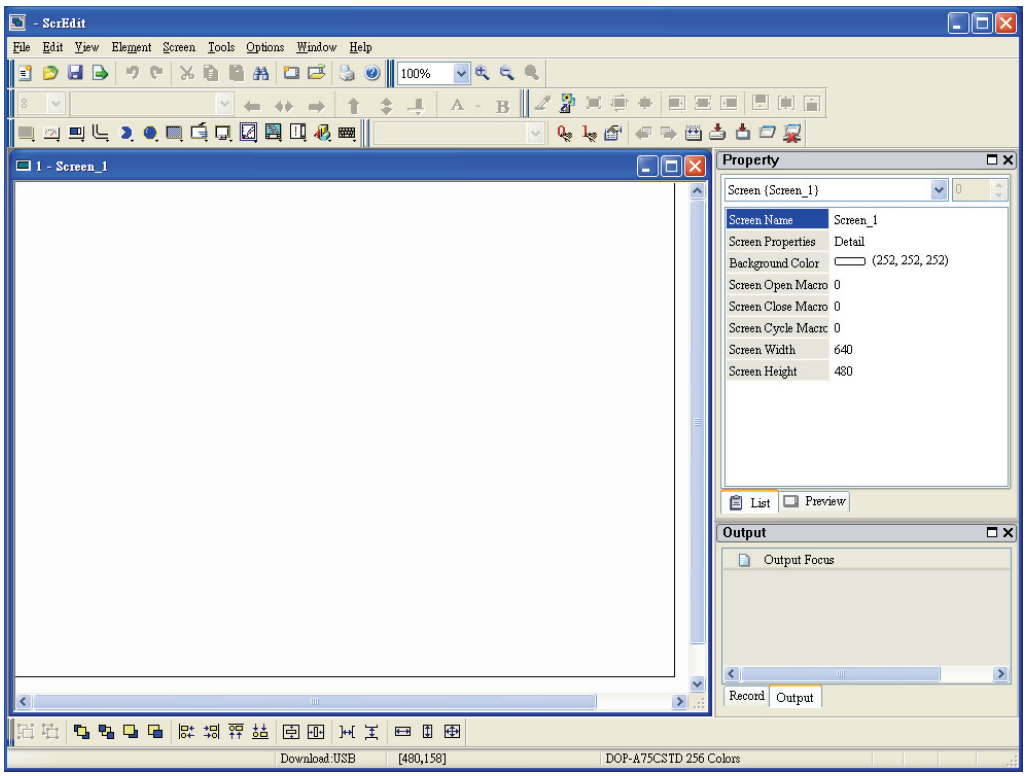
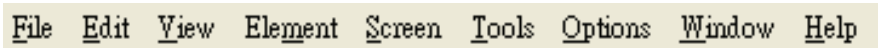


Fig. 2.2.5 New project screen of ScrEdit

There are five parts in the following for ScrEdit editing window.

■ Menu Bar

There are nine functions for selection: File, Edit, View, Element, Screen, Tools, Options, Window, and Help.



■ Toolbar

Toolbar (Fig. 2.2.6) is like those toolbar in Windows® program. It is easy to use for editing and the user can arrange its position freely. For example, the user can move the Toolbar to the left side of the screen. Also, the user can arrange the toolbar position by their usage. The followings are the available toolbar on ScrEdit.

1. Standard Toolbar



2. Zoom Toolbar



3. Text Format Toolbar



4. Bitmap Toolbar



5. Element Toolbar



6. Build Toolbar



7. Layout Toolbar



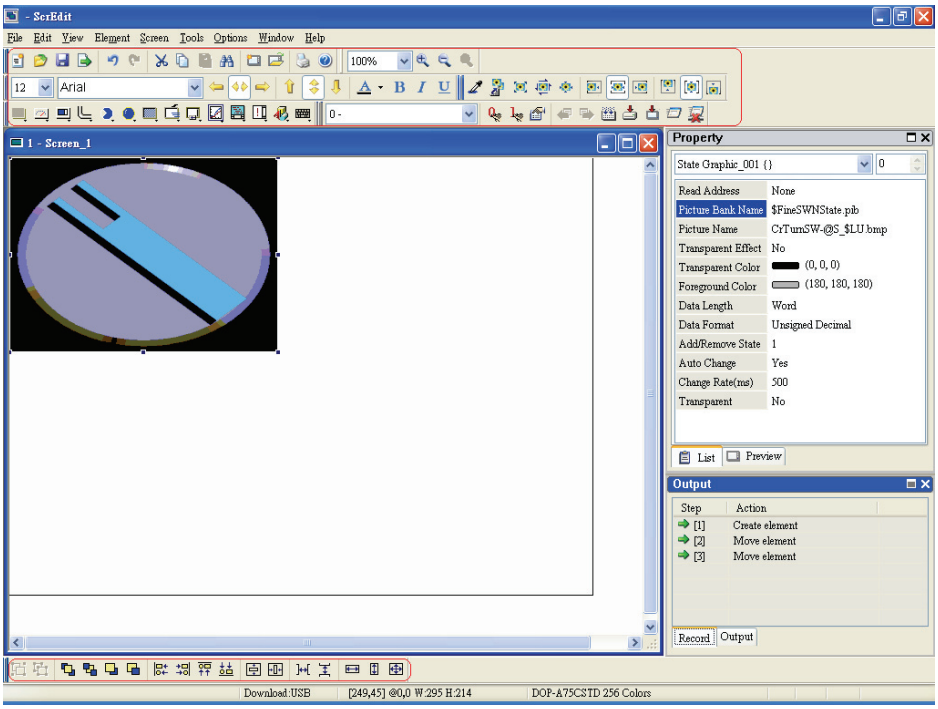


Fig. 2.2.6 ScrEdit Toolbar

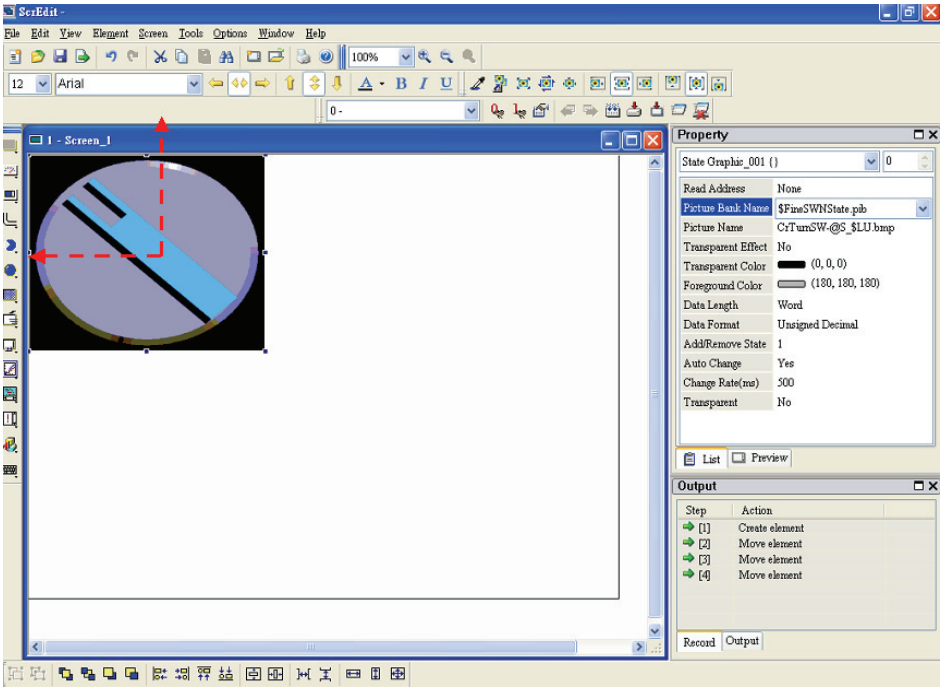


Fig. 2.2.7 Move ScrEdit toolbar to the left side of the screen

■ Property Table

It provides element property settings for each element (Fig. 2.2.8 & Fig. 2.2.9). Please refer to Chapter 3 for detailed description.

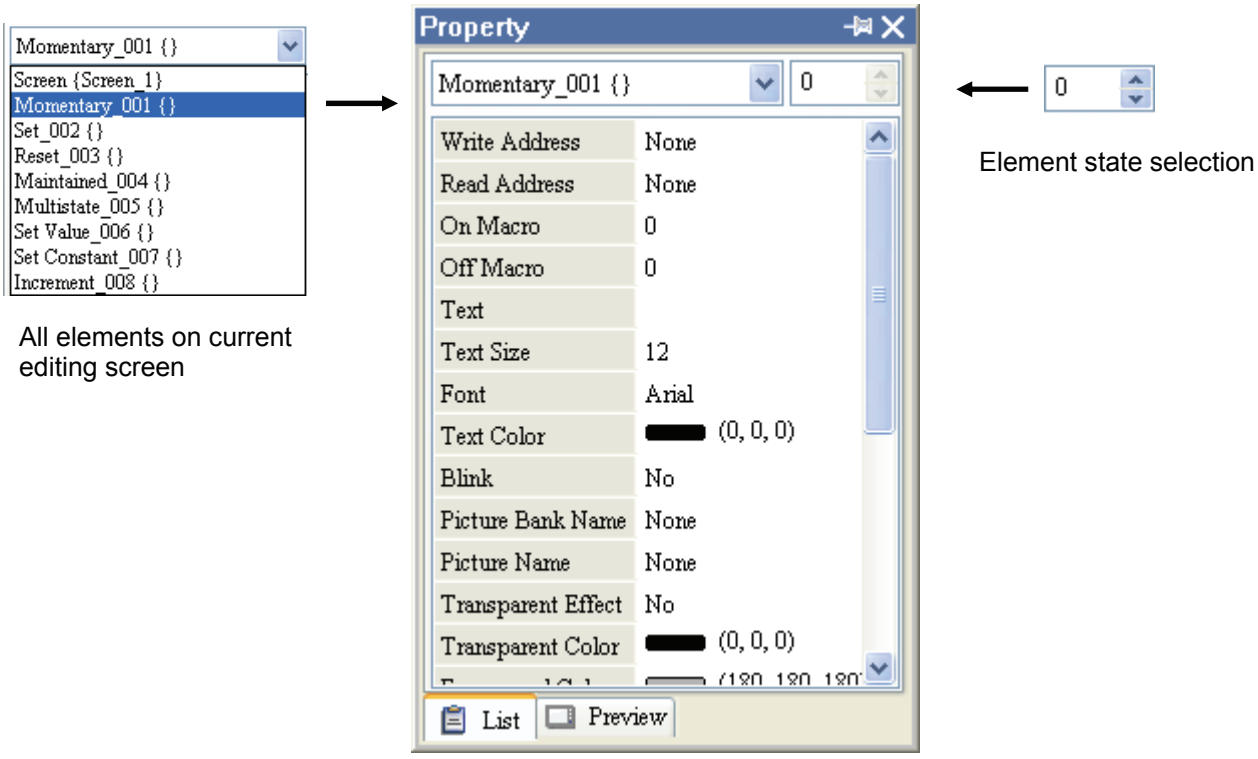


Fig. 2.2.8 Property table

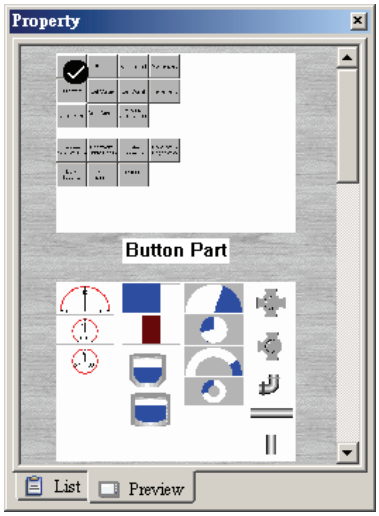


Fig. 2.2.9 Editing screen preview

■ Output Window

All editing actions and output message when compile function is enabled will be shown here (Fig. 2.2.10). When compiling, ScrEdit will detect the error of user program automatically. Once error occurs, the correspondent message will display in output window. Click error message to get error element window.

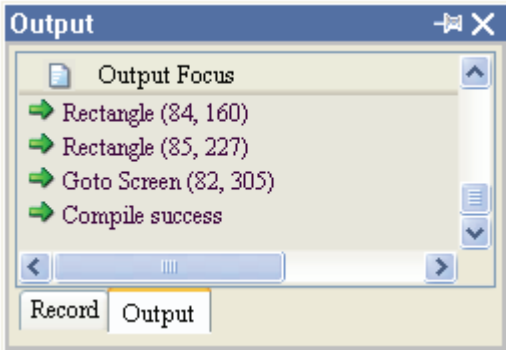


Fig. 2.2.10 Output window

■ Work Place

Following is an editing example display (Fig. 2.2.11).

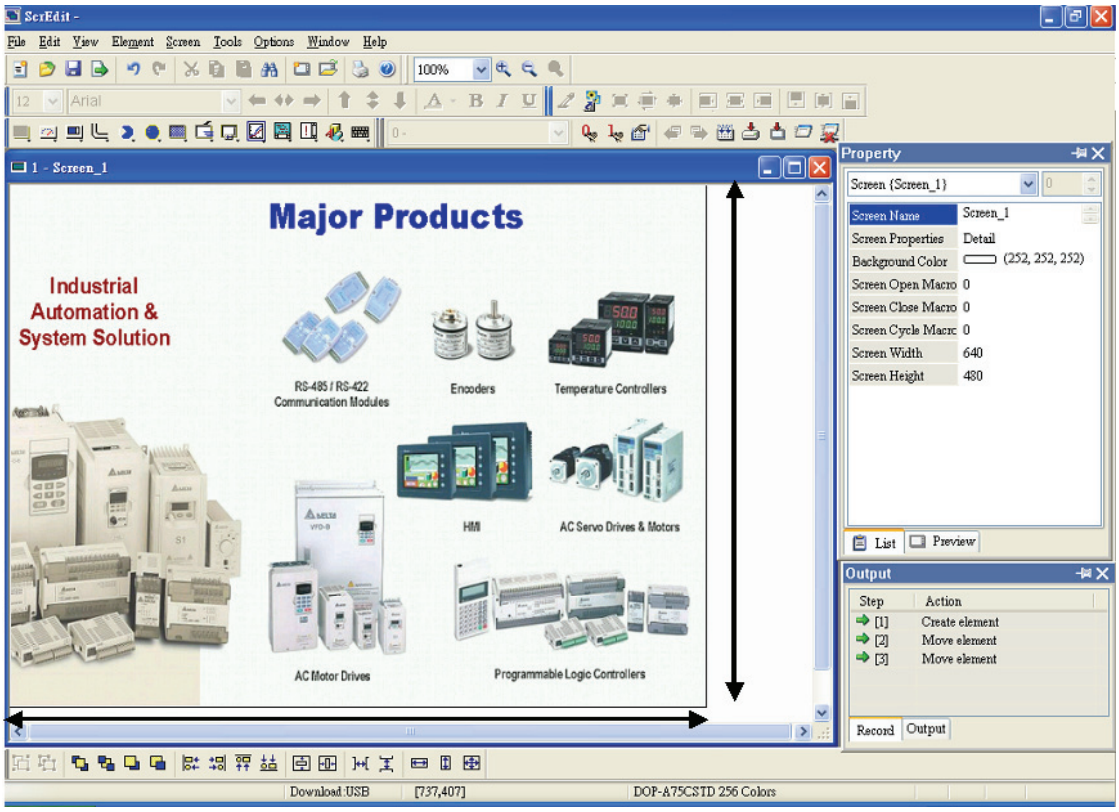
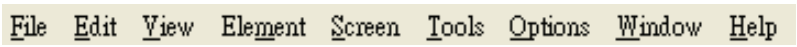


Fig. 2.2.11 ScrEdit Work Place

2.3 Menu Bar and Toolbar (File)

ScrEdit provides the convenient pull-down Menu and makes it easy for the user to create, edit and manage includes elements, pictures, graphs, macro program, recipes and displays in DOP series HMI. The pull-down menu options of Menu bar are described as follows:



■ File

The “File” menu performs many common functions.

1. Allows user to create new project, open old project, close file, save current file and save current file to another file name, etc. options.
2. Make and Open external memory data (Ext. Memory Data).
3. Upload the editing display and data of DOP series HMI to PC and save to hard disk.
4. Update the firmware of DOP series HMI.
5. Password protection function.
6. Screen print, print preview and print setup functions.
7. By default, ScrEdit presents a list of the most recent used files on the File menu for quick access. Just click the file name to open the file.
8. Exit command is to close all open editing files and offer to save those which have not been save yet and finally exit the ScrEdit.

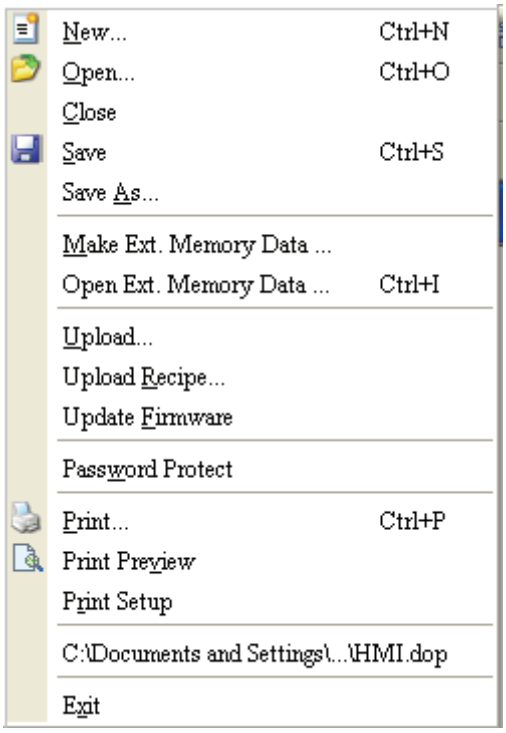


Fig. 2.3.1 File options

■ Create a New Project



Creates a new project by choosing **File** > **New** (Fig. 2.3.2) or clicking the New icon  from toolbar (Fig. 2.3.3), or using keyboard shortcuts by pressing **Ctrl + N**.

1. If this is the first time use and there is no old project, the following dialog box (Fig. 2.3.2) will show up for the user to input project name, screen name, screen number, HMI type and connecting base port controller after creating a new project.

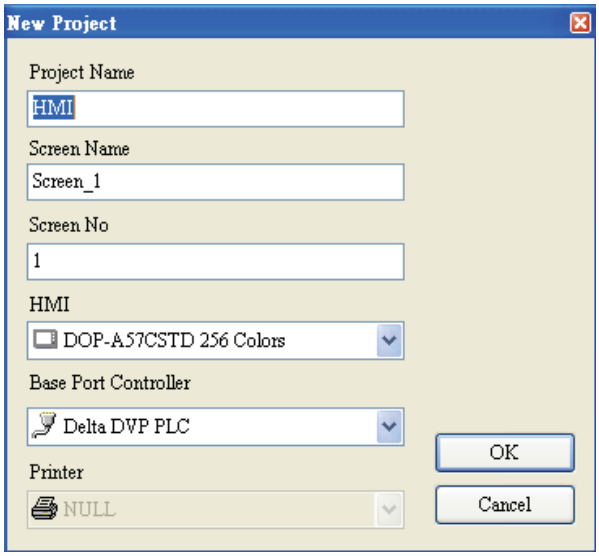


Fig. 2.3.2 New project dialog box

2. If other project files already exist and are open, the user will get the following dialog box to remind the user of saving project (Fig. 2.3.3) before creating new project. Press **Yes** button to save the existed file, press **No** button not to save the file and press **Cancel** button to cancel the save operation. After the user press the **Yes** or **No** button, the new project dialog box will appear again (Fig. 2.3.2).

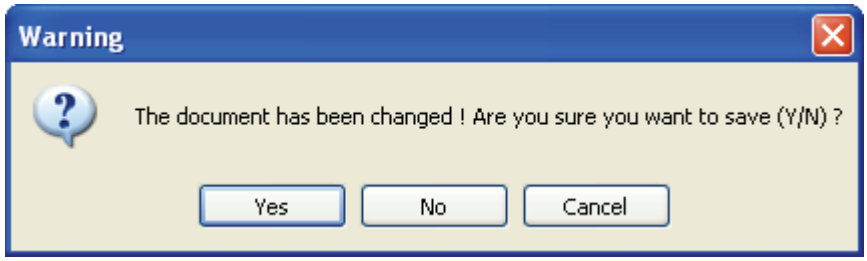


Fig. 2.3.3 Saving dialog box

3. Input project name, screen name, select HMI model and connecting base port controller (Fig. 2.3.4), and then press **OK** button.

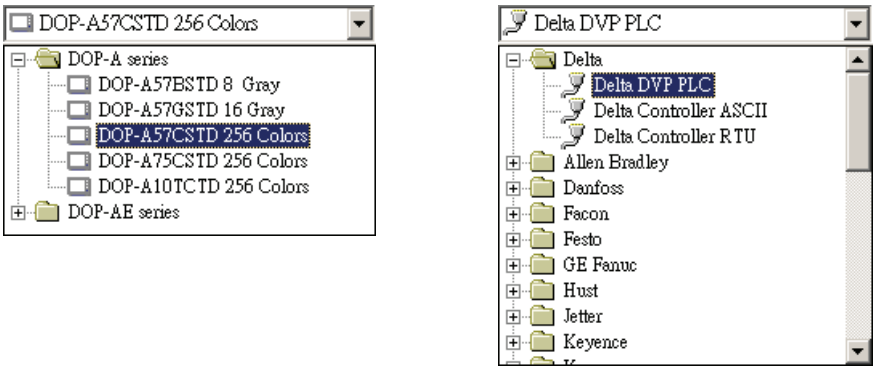


Fig. 2.3.4 HMI model and base port controller options

■ Open Old Project



Open current project by choosing **File** > **Open** (Fig. 2.3.7) or clicking the Open icon  from toolbar, or using keyboard shortcuts by pressing **Ctrl + O**.

1. If other project files exist before opening an old project, the user will get the Saving dialog box (Fig. 2.3.3) to remind the user of saving file and then get the following dialog box for opening existing dop file (Fig. 2.3.5).
2. If save operation is complete or there is no old project files, the following dialog box for opening existing dop file (Fig. 2.3.5) will show up directly.

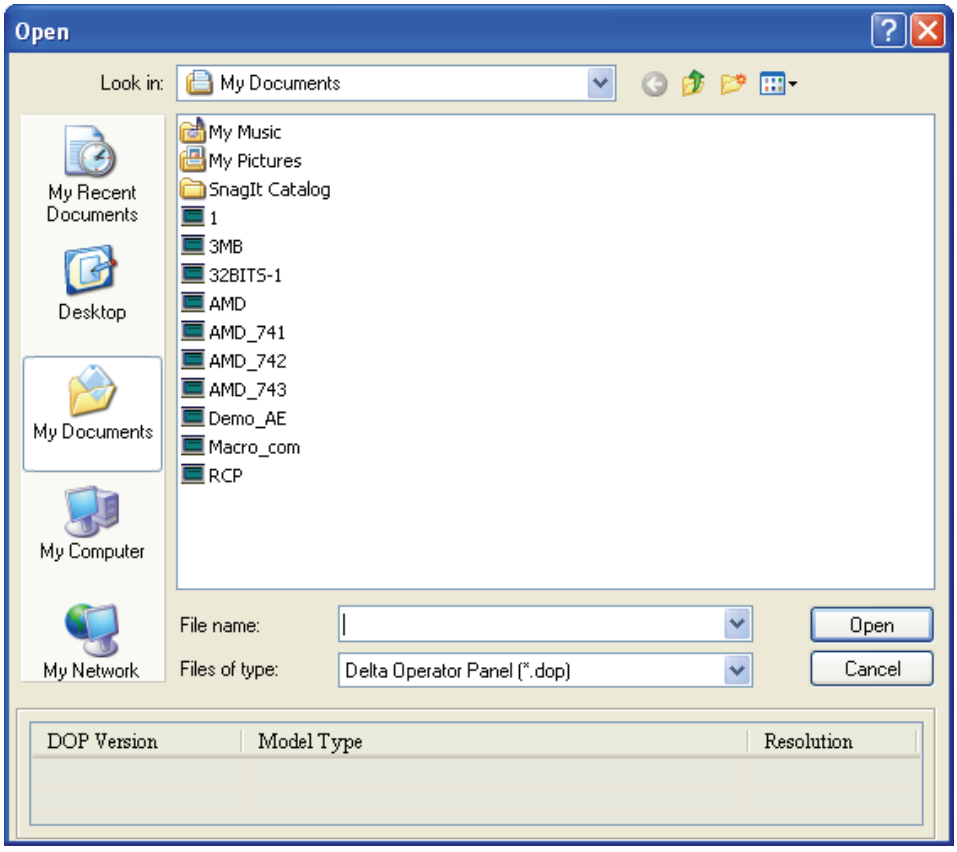


Fig. 2.3.5 Open an old project in ScrEdit

■ Close File



Closes project by clicking **File** > **Close** (Fig. 2.3.10).

1. If project didn't get saved before issuing the command of closing project, the user will get saving dialog box (Fig. 2.3.6) to remind the user of saving project.

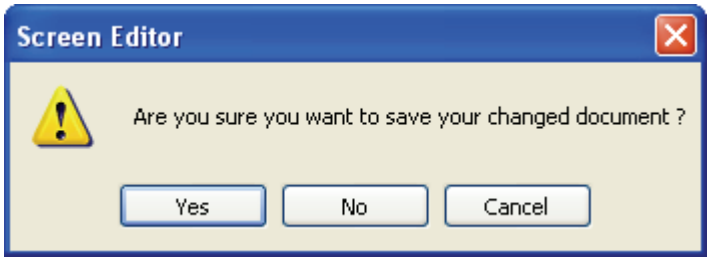


Fig. 2.3.6 Saving dialog box

■ Save File



Save current project into hard disk with extension file "dop" by choosing **File** > **Save** (Fig. 2.3.12) or clicking the Save icon  (Fig. 2.3.13), or using keyboard shortcuts by pressing **Ctrl** + **S**. If the project is a new file, the Save as dialog box will show up (Fig. 2.3.15). If the project is an old file, the Save function will perform immediately and the Save as dialog box will not show up.

■ Save As



Save current project to another file name by clicking **File** > **Save As** (Fig. 2.3.14). The user will get Save as dialog box (Fig. 2.3.15) to input project name with extension file dop. This dialog also appears automatically when the first time any project file is saved no matter whether Save As or Save command is used.

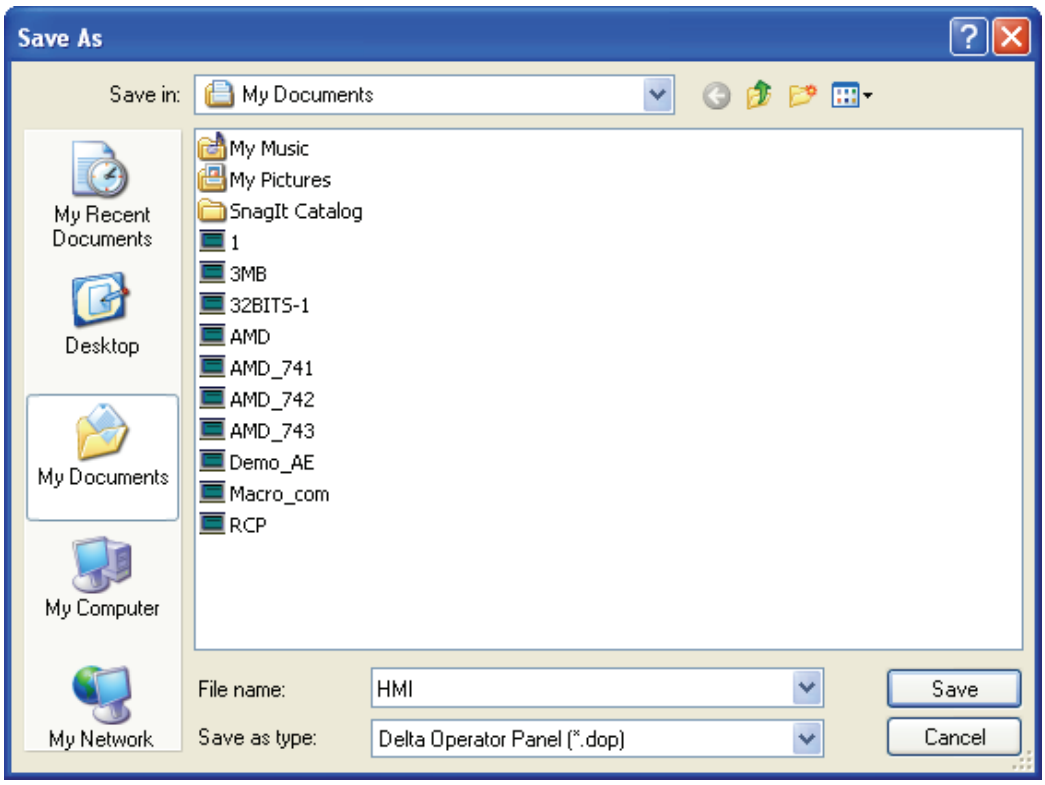
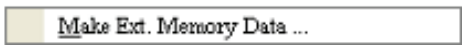


Fig. 2.3.7 Save as dialog box (Dialog box that let user input project name to save as.)

■ **Make Ext. Memory Data**



Before using this command, ensure to compile the editing screen data. If not execute the compilation first, the ScrEdit cannot make screen data and an error message dialog box will show up (Fig. 2.3.8). Please execute the compilation first and then clicking **File** > **Make Ext. Memory Data** to copy the compiled HMI program into SM card (Fig. 2.3.9) or a USB flash drive. If the SM card or USB flash drive with compiled HMI program stored inside is inserted into HMI, HMI will startup by reading the data of SM card or USB flash drive directly.

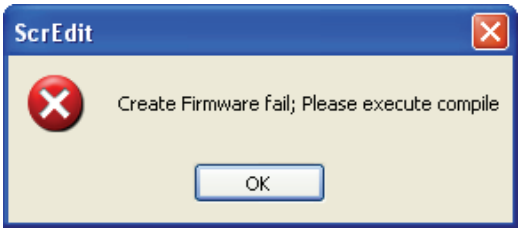


Fig. 2.3.8 Error message dialog box when making Ext. Memory Data

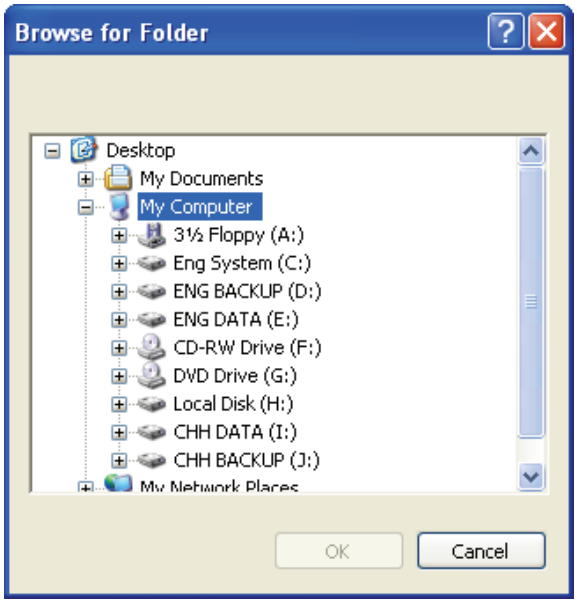
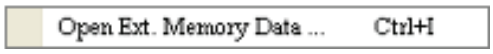


Fig. 2.3.9 Make Ext. Memory Data Dialog Box

- **Open Ext. Memory Data**



In HMI, the user can move the screen data saved in the flash memory into SM card through folder manager. Then, perform **Open Ext. Memory Data** function and the user will get the user will get Fig. 2.3.9 dialog box. At this time, the user can open the screen data and edit the HMI screen data directly.

- **Upload Screen Data and Recipe**



After clicking **File** > **Upload**, the password dialog box will show up first (Fig. 2.3.10), the user needs to input password (the password is the highest priority saved in HMI, which is set by clicking **Options** > **Configuration** > **Standard** > **Security**). When entering the correct password, the user can get save as dialog box (Fig. 2.3.7). After inputting project file name, the uploading will start (Fig. 2.3.11). The user can get the progress with progress box and stop uploading by clicking **Stop** button. When progress goes to 100%, it indicates that the uploading is complete. The user can press **Stop** button to exit the dialog box. The file that is uploaded from HMI can be restored to original editing file for user to edit. This option is to avoid losing the original editing file. If the user wants to upload data with pictures also, just select the “Include Picture Data when uploading” in Environment dialog box by clicking **Options** > **Environment**.

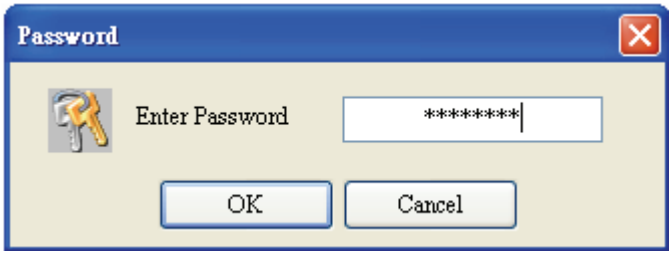


Fig. 2.3.10 Enter password dialog box

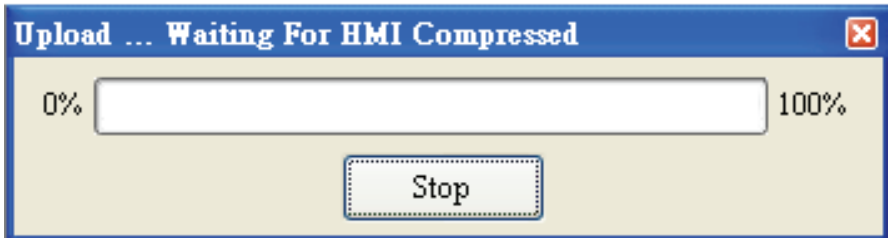


Fig. 2.3.11 Uploading screen

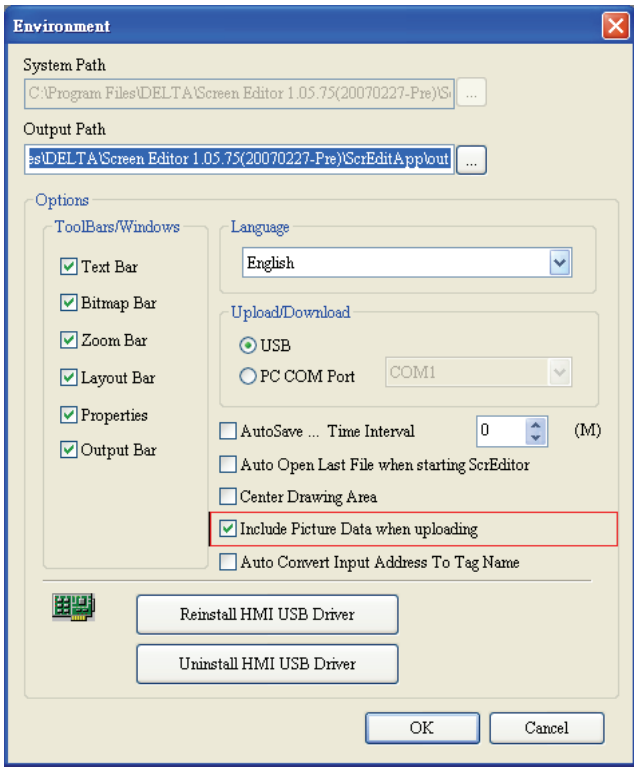


Fig. 2.3.12 Environment dialog box

■ Upload Recipe



This function is similar to upload function but it can only upload recipe. Before uploading, it also needs to enter password (the password is the highest priority saved in HMI, which is set by clicking **Options** > **Configuration** > **Standard** > **Security**).

■ Update Firmware



This option is for upgrading HMI firmware or adding function for HMI (Fig. 2.3.13). Keeping HMI firmware version to be the most updated version can optimize HMI operation. Ensure that the software version of ScrEdit matches the firmware version. The user can get the firmware information by clicking **Tools** > **Get Firmware Information**. Regarding the software version of ScrEdit, the user can find it by clicking **Help** > **About ScrEdit** (Fig. 2.3.14).



Fig. 2.3.13 Choosing Update Firmware command from menu bar



Fig. 2.3.14 About ScrEdit

■ Password Protect



The user can enable and disable password protect function (Fig. 2.3.15 & Fig. 2.3.16) by clicking **File** > **Password protect**. Once password protect function is enabled, the user will get Fig. 2.3.15 dialog box and ☑ symbol before “Password Protect” command. If the ☑ symbol shows before “Password Protect” command from File menu, it indicates that this dop file is password protected and the user will need to input password before opening dop file. The password is set by clicking **Options** > **Configuration** > **Standard** > **Security**) (Fig. 2.3.17). If the password protect function is disabled, the Fig. 2.3.16 dialog box will show up.



Fig. 2.3.15 Password protect function is enabled



Fig. 2.3.16 Password protect function is disabled

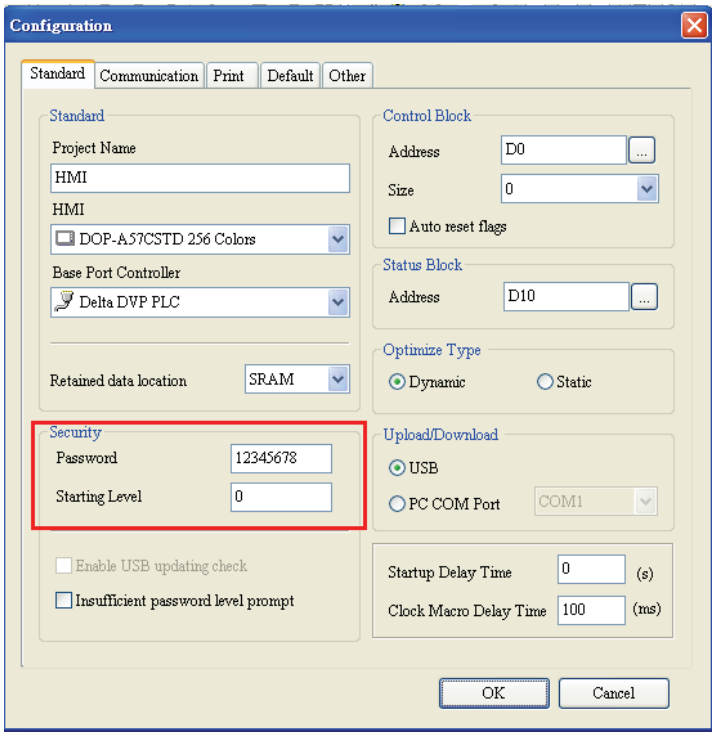


Fig. 2.3.17 Password settings - Security

■ Print



Print current screen by choosing **File** > **Print**, or clicking the Print icon  from toolbar (Fig. 2.3.28), or using keyboard shortcuts by pressing **Ctrl** + **P**.

■ Print Preview



Select this function by clicking **File** > **Print Preview**. Using this function can preview the full page after printing (Fig. 2.3.18).



Fig. 2.3.18 Print Preview screen

■ Print Setup



Printer and paper settings. Select this function by clicking **File** > **Print Setup**. Using this function can set the property of printer, print paper and print direction, etc. several functions (Fig. 2.3.19).

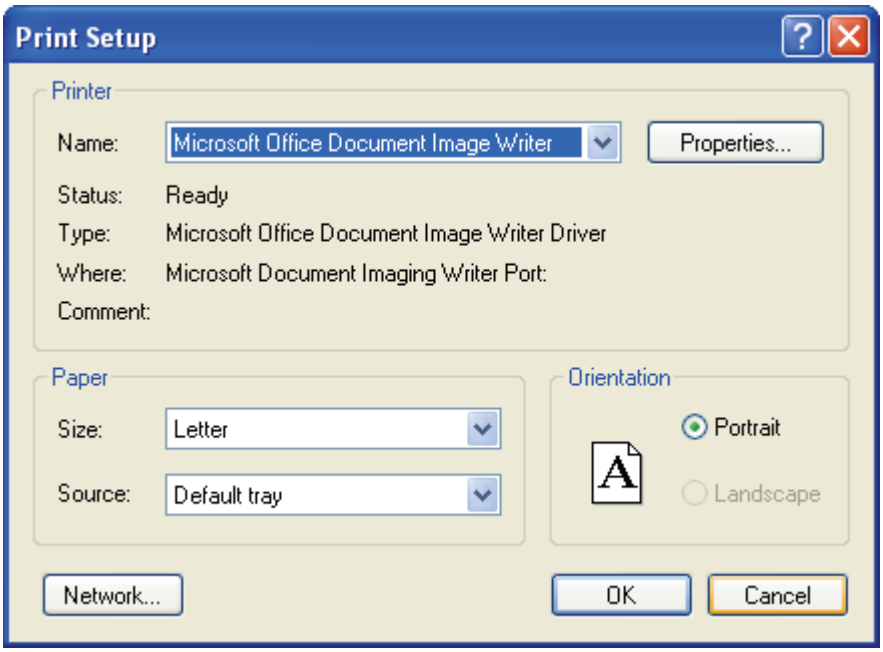


Fig. 2.3.19 Print Setup dialog box

■ File Quick Access

By default, ScrEdit presents a list of the four most recent used files on the File menu for quick access (Fig. 2.3.20). Just click the file name to open the file. This function is similar to the Open command and the user can refer to the description of Open command on the page 2-14. If the saving path is too long, the too long path will display as "….". The user still can see the complete dop file name.

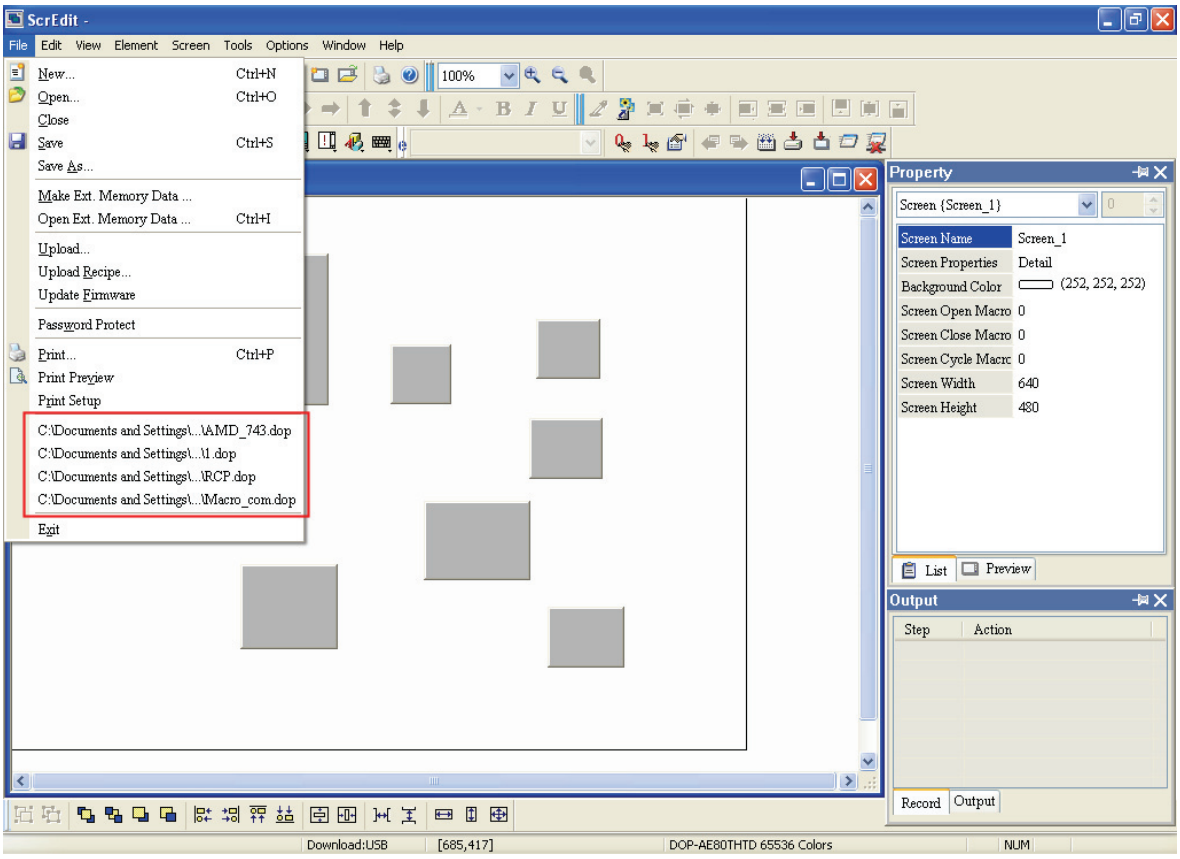


Fig. 2.3.20 Most recent used files

■ Exit



Exit function is to close all open editing files and offer to save those that have not been save yet and finally exit the ScrEdit. Select this function by clicking **File** > **Exit**. If the file has been changed or not saved yet, the saving dialog box (Fig. 2.3.6) will show up to remind the user of saving project. If the user press **Cancel** button at this time, the exit command is cancelled. Either pressing **Yes** button to save the file, or pressing **No** button not to save the file can exit the ScrEdit. After the user press the **Yes** button, the Save As dialog box will appear (Fig. 2.3.7) for saving the file.

2.4 Menu Bar and Toolbar (Edit)

■ Edit

Adopt pull-down menu similar to Microsoft Office style and provide user-friendly Edit pull-down menu (Fig. 2.4.1).

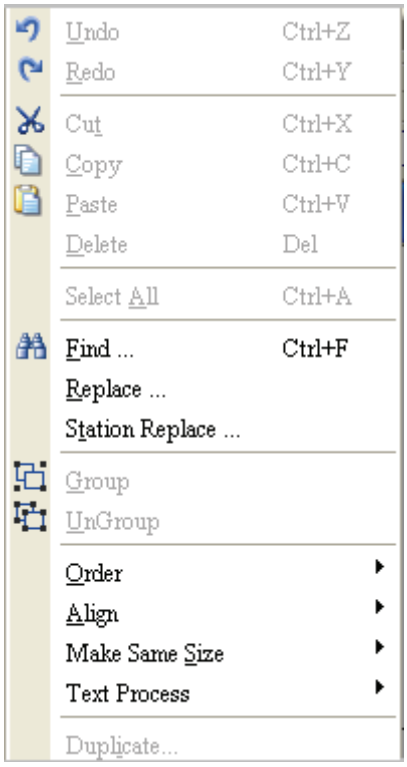


Fig. 2.4.1 Edit options

■ Undo



Undo the last action. Select this function by choosing **Edit** > **Undo** or clicking the Undo icon  from toolbar, or use keyboard shortcuts by pressing **Ctrl** + **Z**. All actions are recorded in output window.

■ Redo



Redo the undo action. Select this function by choosing **Edit** > **Redo** or clicking the Redo icon  from toolbar, or use keyboard shortcuts by pressing **Ctrl** + **Y**. All actions are recorded in output window.

■ Cut



Deletes the selected element and save it in clipboard to paste to other place. Select this function by choosing **Edit** > **Cut** from menu bar or clicking the Cut icon  from toolbar, or use keyboard shortcuts by pressing **Ctrl** + **X**.

■ Copy



Copy the selected element to the clipboard. Select this function by choosing **Edit** > **Copy** from menu bar or clicking the Copy icon  from toolbar, or use keyboard shortcuts by pressing **Ctrl** + **C**.

■ Paste



Paste element from clipboard. Select this function by choosing **Edit** > **Paste** from menu bar or clicking the Paste icon  from toolbar, or use keyboard shortcuts by pressing **Ctrl** + **V**.

■ Delete



Delete selected element. Select this function by choosing **Edit** > **Delete** from menu bar or use keyboard shortcuts by pressing **Del**.

■ Select All



It is used to select all elements. Select this function by choosing **Edit** > **Select All** from menu bar or use keyboard shortcuts by pressing **Ctrl** + **A**. When selecting all, the last created element, i.e. the picture on the top will be a square that is filled with blue color and the border is in white. The other created elements will be in white color and the border is in black. This is to provide a reference for Align and Make Same Size function. When there are two and more elements, one element should be the base element. The base element is used to align or resize.

■ Find



It is used to find the content matches the find criteria. Select this function by choosing **Edit** > **Find** from menu bar or use keyboard shortcuts by pressing **Ctrl** + **F**. The user can find element text, read address, write address or memory address in current screen, or all screens (Fig. 2.4.2). Once it finds, the result of find content will be shown in the output window. Click some of the result of find content, it will jump to its location in ScrEdit (Fig. 2.4.3).

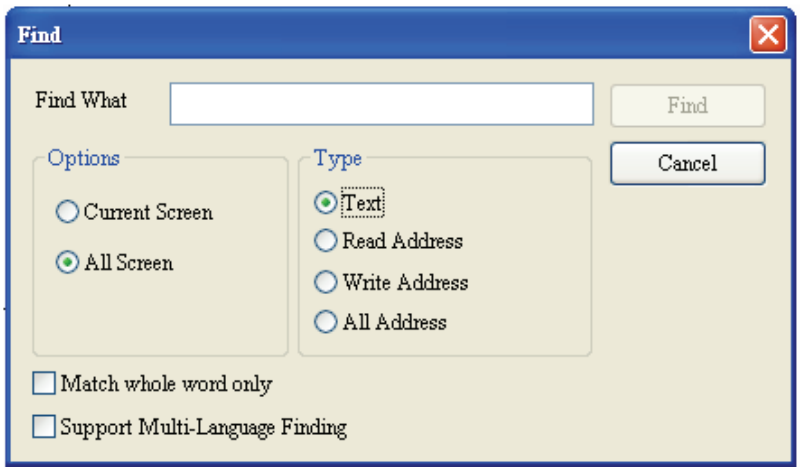
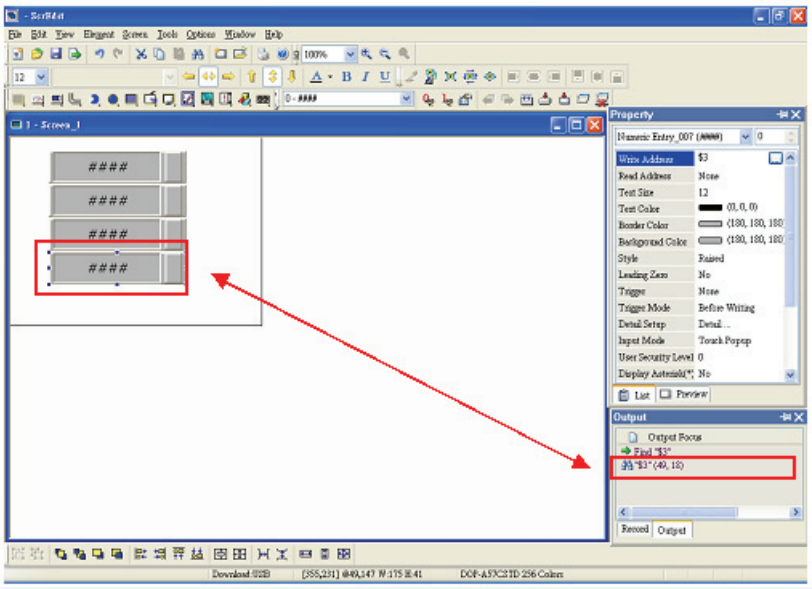


Fig. 2.4.2 Find option

Find		
Find What	This field is where the user enters the word or phase that the user is looking for	
Options	Current Screen	This causes ScrEdit to navigate the current screen only and find the matching word or phase that the user is looking for. The output window will display all matching words or phases. When the user double clicks the word or phase, ScrEdit will jump to that location of the matching word or phase. Please refer to the example screen below.  Fig. 2.4.3
	All Screen	This causes ScrEdit to navigate all screens and find the word or phase that the user is looking for. The output window will display all matching words or phases. When the user double clicks the word or phase, ScrEdit will also jump to that location of the matching word or phase.
Type	Text	This causes ScrEdit to find the text.
	Read Address	This causes ScrEdit to find the read address.
	Write Address	This causes ScrEdit to find the write address.
	All Address	This causes ScrEdit to find the read and write address.
Check Box	If “Match whole word only” box is checked, only the exact word or phase that the user types will be found. If “Match whole word only” box is not checked, all words that contain the word or phase that the user types will be found. If “Support Multi-Language Finding” box is checked, all multi language words that contain the word or phase that the user types will be found. However, “Support Multi-Language Finding” option can only be enabled when the find content type is text.	

■ Replace



It is used to replace the content (Fig. 2.4.4). Using this command can replace text, read address and write address in current screen or all screens. Its function is very similar to Find command expect that it not only can find the word or phase that the user is looking for but also can replace it with a new entry. The replace content type could be text, read and write address and the replace content data type could be Bit, Word or Double Word. The function of replace content data type is enabled only when the replace content type is either read or write address. Select this function by choosing **Edit** > **Replace** from menu bar or use keyboard shortcuts by pressing **Ctrl** + **R**.

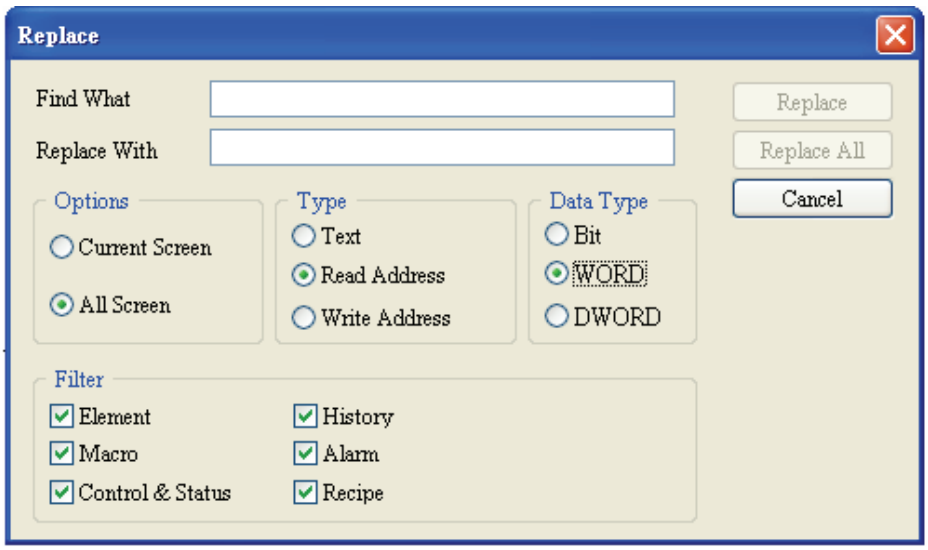


Fig. 2.4.4 Replace option

Replace		
Find What	This field is where the user enters the word or phase that the user is looking for	
Replace With	This field is where the user enters the word or phase that the user wants to replace with	
Options	Current Screen	This causes ScrEdit to navigate the current screen only, find the matching word or phase that the user is looking for and replace it.
	All Screen	This causes ScrEdit to navigate all screens and find the matching word or phase that the user is looking for and replace it.
Type	Text	This causes ScrEdit to find and replace the text.
	Read Address	This causes ScrEdit to find and replace the read address.
	Write Address	This causes ScrEdit to find and replace the write address.
Data Type	Bit	The function of replace content data type is enabled only when the replace content type is either read or write address. The replace content data type could be Bit, Word or Double Word.
	WORD	
	DWORD	
Filter	Element	This option is available when the replace content is read and write address. There are six options for selection, Element, Macro, Control & Status, History, Alarm and Recipe.
	Macro	
	Control & Status	
	History	
	Alarm	
	Recipe	
Replace Replace All	Replace button is used to replace the word or phase that the user types and find and select the next one. For example, the user wants to replace the read address from $0 to $1234, enter $0 in Find What field, enter $1234 in Replace With field and press Replace button (Fig. 2.4.5). ScrEdit will find the matching address (Fig. 2.4.6) and the user can select which the address of the element should be replaced. Replace All button is used to replace all found matching words automatically.	

Replace

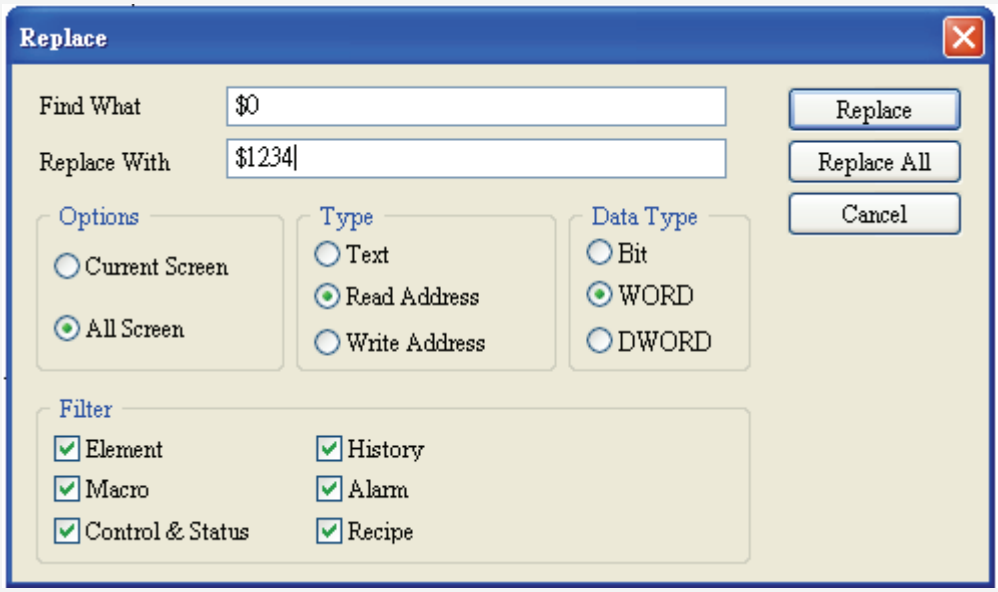


Fig. 2.4.5

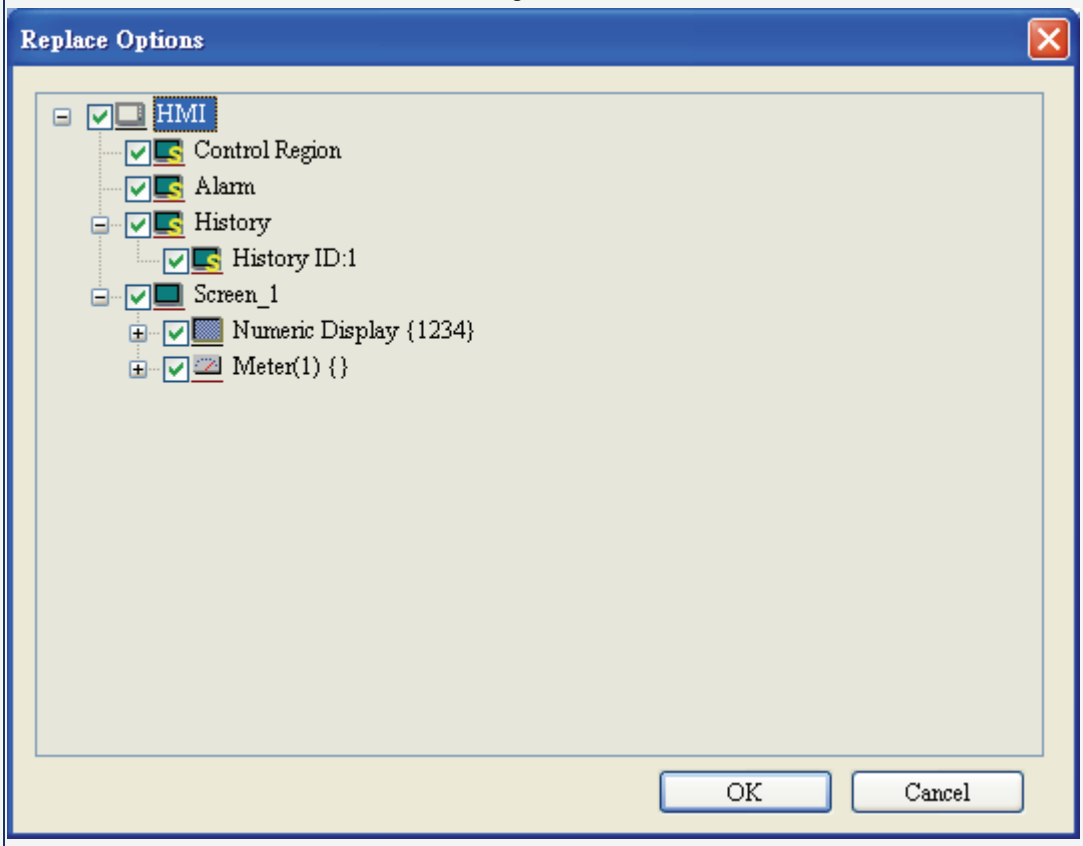


Fig. 2.4.6

■ Group



It is used to group elements in ScrEdit. Select this function by choosing **Edit** > **Group** from menu bar or clicking the Group icon  from toolbar. When two or more elements are grouped, it will be regarded as a single unit and move together but the element size cannot be changed.

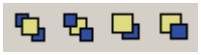
- **Ungroup**



It is used to ungroup elements in ScrEdit. Select this function by choosing **Edit** > **Ungroup** from menu bar or clicking the Group icon  from toolbar.

- **Order**



It is used to set and change the stacking order of the selected element. Select this function by choosing **Edit** > **Order** from menu bar or clicking the Order icons  from toolbar.

 Bring to Front. Move the selected element to the front of all other elements.

 Send to Bottom. Move the selected element behind all other elements.

 Bring Forward. Move the selected element forward one position.

 Send Backward. Move the selected element behind one position.

- **Align**



It is used to align the element. The user can select this function by choosing **Edit** > **Align** from menu bar or clicking the Align icons from toolbar.

The Align icons includes:

 : Align Left;  : Align Right;  : Align Top;  : Align Bottom;

 : Center Vertically;  : Center Horizontally;

 : Across Space Evenly;  : Down Space Evenly.

Align Left, Align Right, Align Top and Align Bottom commands are available when two or more elements are selected. That is because the element only can be left, right, top and bottom aligned relative to another element. Align Vertical Center and Align Horizontal Center commands are available when one or more elements are selected. Across Space Evenly and Down Space Evenly are available when three or more elements are selected.

After Align commands are used, the coordinates of the elements will changed to the coordinates of the new position.

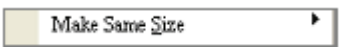
Center Vertically: Set the element to be the vertical position of the work place.

Center Horizontally: Set the element to be the horizontal position of the work place.

Across Space Evenly: Make all the elements align in a consistent width.

Down Space Evenly: Make all the elements align in a consistent height.

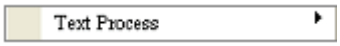
- **Make Same Size**



It is used to make the element to be the same size. The user can select this function by choosing **Edit** > **Make Same Size** from menu bar or clicking the Make Same Size icons from toolbar.

This function is available only when two or more elements are selected. The user has to select one element first and treat it as standard, and use this command to make other two or more elements to be the same size.

■ Text Process



It is used to set and change text direction and import text in ScrEdit. The user can select this function by choosing **Edit** > **Text Process** from menu bar or clicking the Text Process icons from toolbar.

 next to the Text Process command represents that this function is enabled. In the Import Text dialog box, the user can decide if use Text Bank Edit Font or not. If the user checks the box next to Text Bank Edit Font, the imported text will be display by adopting the fonts of Text Bank. For the settings of Text Bank, please refer to **Option** > **Text Bank**.

■ Duplicate



It allows the user to copy one or more elements horizontally and vertically at the same time. After selecting this function by choosing **Edit** > **Duplicate** from menu bar, the Fig. 2.4.7 dialog box will show up. The user can enter the number of columns and rows to get the total copy numbers. If the user only wants to copy the number of Rows, please uncheck the box next to Columns. If the user only wants to copy the number of Columns, please uncheck the box next to Rows.

Spacing (pixels): This option is used to set the spacing by horizontal or vertical direction between every element. After this option is set, the duplicated elements will be placed in this spacing.

Increase / Decrease Address: This option is used to place the element that the user copies by ascending or descending address. The unit of the address can be Word or Bit.

X-direction / Y-direction: This option is used to place the element that the user copies by horizontal (X-direction) or vertical (Y-direction) direction.

Please refer to Fig 2-4-30 and Fig. 2-4-31 for example.

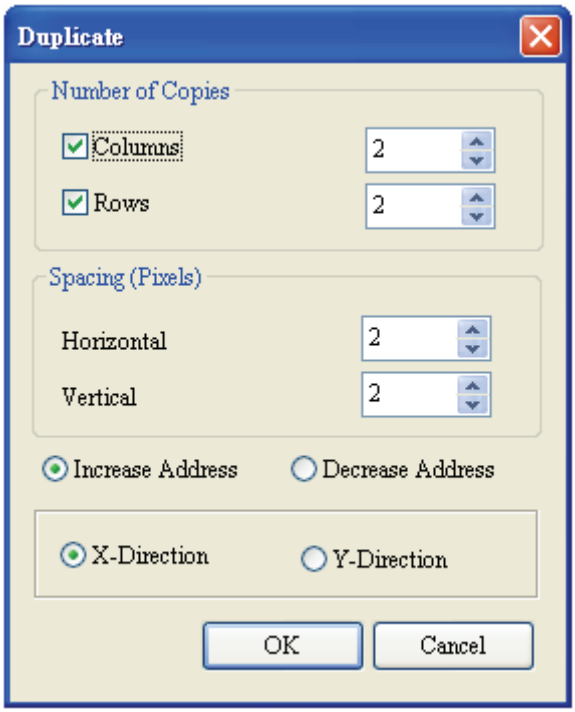


Fig. 2.4.7 Duplicate dialog box

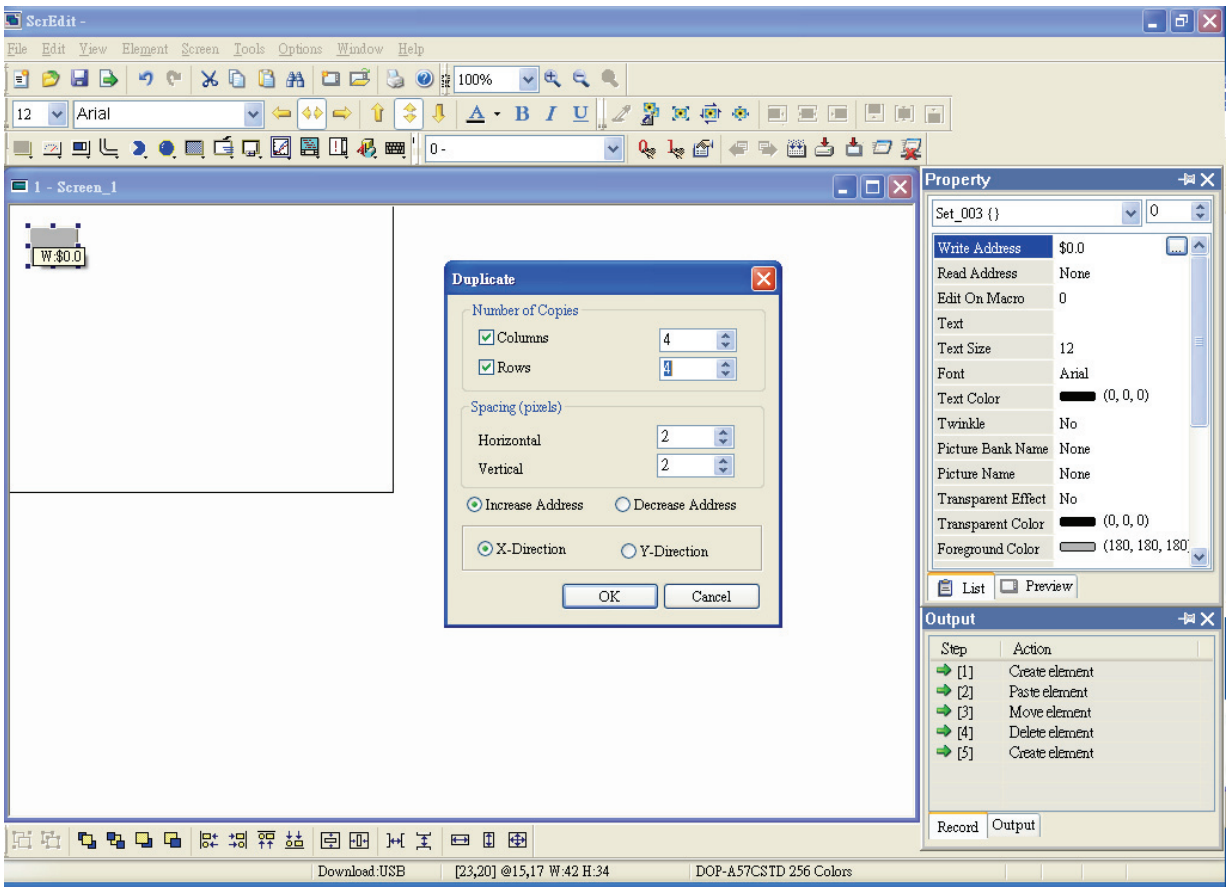


Fig. 2.4.8 Duplicate Example 1

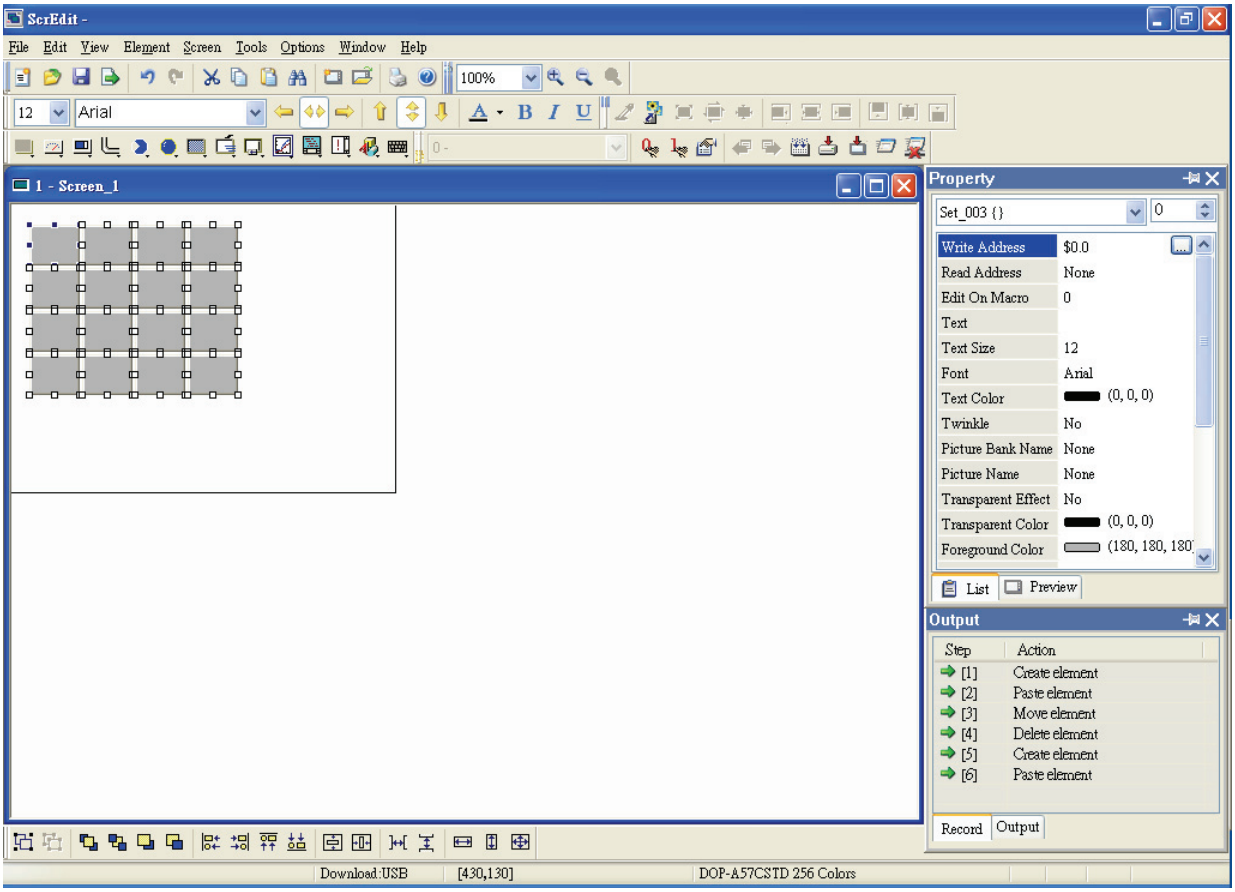


Fig. 2.4.9 Duplicate Example 2

2.5 Menu Bar and Toolbar (View)

■ **View**

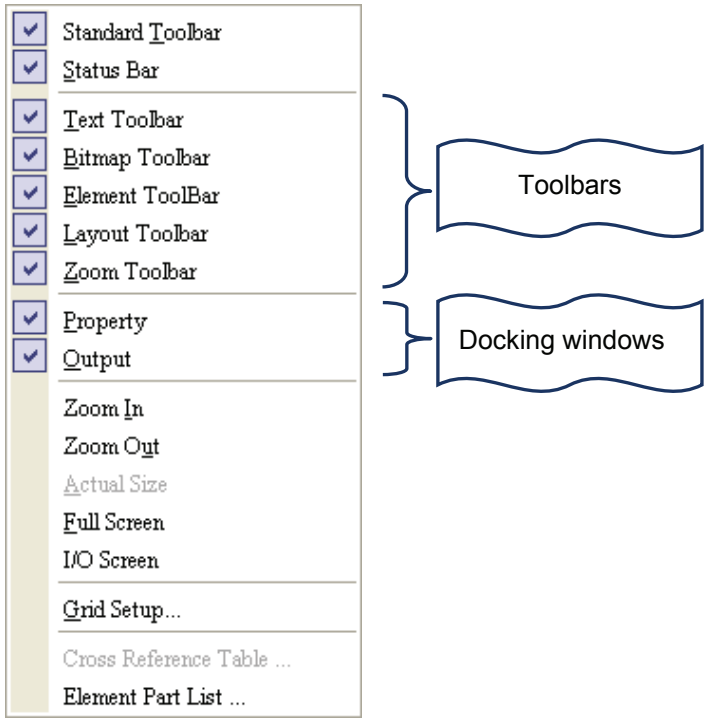


Fig. 2.5.1 View options

In View option, the user can decide how toolbars and docking windows display. Once the user clicks on it, it will have icon ☑ in front of it and display on screen. The user can also arrange these toolbars and docking windows by themselves. If ☑ not show in front of the toolbar, it indicates that the toolbar is hided and not display on the screen. The description of each toolbar is introduced in the following sections.

■ **Standard Toolbar**



Table 2.5.1 Standard toolbar

Icon	Function	Description
	New	Create a new project
	Open	Open an old project
	Save	Save current edited project
	Export	Export an project to BMP format
	Undo	Undo an action (some can't be undo)
	Redo	Redo an action
	Cut	Cut selected elements
	Copy	Copy selected elements

Icon	Function	Description
	Paste	Paste the element the user copy or cut
	Find	Find specific text, write address or read address
	New Screen	Create a new screen
	Open Screen	Open an old screen
	Print	Print current project
	Help	Screen editor version

■ **Status Bar**

Display current editing states.

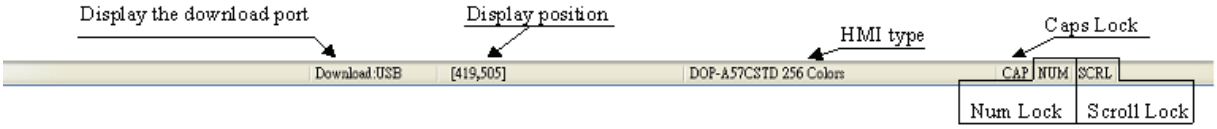


Fig. 2.5.2 Status bar

■ **Text Format Toolbar**



Table 2.5.2 Text toolbar

Icon	Function	Description
48	Font Size	Display and change text size
Arial	Font Name	Display and change text font
	Align Left	Align text to left
	Center Horizontal	The space at the right/left sides of text will be the same
	Align Right	Align text to right
	Align Top	Align text to top
	Center Vertical	The space at the top/bottom sides of text will be the same
	Align Bottom	Align text to bottom
	Text Color	Change text color
B	Bold	Text bold
I	Italic	Text Italic
U	Underline	Add line under text

■ **Bitmap Toolbar**

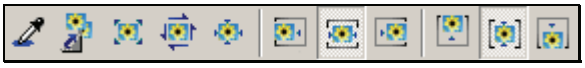


Table 2.5.3 Bitmap toolbar

Icon	Function	Description
	Select Transparent Color	Remove the color of the picture and determine the transparent color of the picture
	Chang Mode for Process All State Picture	If this function is enabled, not only the current picture with current state but also all pictures with all states will be stretched, resized or aligned
	Picture Stretch All	Stretch the selected picture to the whole range of the element.
	Picture Stretch 1: 1	Scale the picture relative to original picture size
	Original Picture	Resize the selected picture to the actual picture size
	Picture Align Left	Align the selected picture to left
	Picture Center Horizontal	The space at the right/left sides of the selected picture will be the same
	Picture Align Right	Align the selected element to right
	Picture Align Top	Align the selected element to top
	Picture Center Vertical	The space at the top/bottom sides of the selected element will be the same
	Picture Align Bottom	Align the selected element to bottom

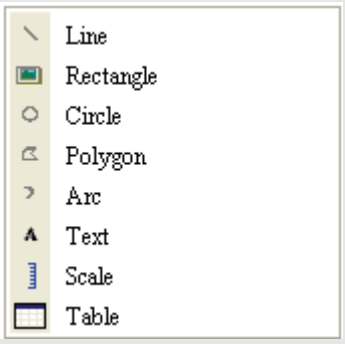
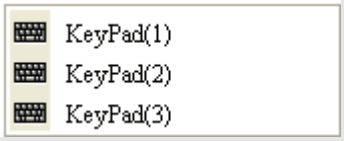
■ **Element Toolbar**



Table 2.5.4 Element toolbar

Icon	Function	Drop-down Menu
	Button	Set Reset Momentary Maintained Multistate Set Value Set Constant Increment Decrement Goto Screen Previous Page System Date Time Password Table Setup Enter Password Contrast/Brightness Low Security System Menu Report List

Icon	Function	Drop-down Menu
	Meter	Meter(1) Meter(2) Meter(3)
	Bar	Normal Deviation
	Pipe	Pipe(1) Pipe(2) Pipe(3) Pipe(4) Pipe(5) Pipe(6) Pipe(7)
	Pie	Pie(1) Pie(2) Pie(3) Pie(4)
	Indicator	Multistate Indicator Range Indicator Simple Indicator
	Display	Numeric Display Character Display Date Display Time Display Day-of-week Display Prestored Message Moving Sign
	Movement	State Graphic Animated Graphic Dynamic Line Dynamic Rectangle Dynamic Ellipse
	Input	Numeric Entry Character Entry
	Curve	Trend Graph X-Y Chart
	History	Historical Trend Graph Historical Data Table Historical Event Table

Icon	Function	Drop-down Menu
	Alarm	
	Graphic	
	Keypad	

■ **Build / Layout Toolbar**

Build Toolbar



Table. 2.5.5 Build toolbar

Icon	Function	Description
	Current Element State	Text on selected element
	View State OFF/1	Switch and view current state OFF/1
	View State ON/1	Switch and view current state ON/1
	Display All Read/Write Address	Display all read/write addresses of all elements
	Previous windows	Select previous windows
	Next windows	Select the next windows
	Compile	Compile current element
	Download Screen and Recipe	Download screen data and recipe
	Download Screen	Download screen data
	On-line Simulation	Test editing file at PC side and it needs to connect to the controller
	Off-line Simulation	Test editing file at PC side and it doesn't need to connect to the controller

Layout Toolbar



Table. 2.5.6 Layout toolbar

Icon	Function	Description
	Group	Group the selected elements
	Ungroup	Ungroup the selected elements
	Bring to Front	Move the selected element to the front of all other elements
	Send to Bottom	Move the selected element behind all other elements
	Bring Forward	Move the selected element forward one position
	Send Backward	Move the selected element behind one position
	Align Left	Align the selected elements to left
	Align Right	Align the selected elements to right
	Align Top	Align the selected elements to top
	Align Bottom	Align the selected elements to bottom
	Center Vertically	Set the element to be the vertical position of the work place
	Center Horizontally	Set the element to be the horizontal position of the work place
	Across Space Evenly	Make all the elements align in a consistent width
	Down Space Evenly	Make all the elements align in a consistent height
	Make Same Width	Make the selected elements to be the same width
	Make Same Height	Make the selected elements to be the same height
	Make Same Size	Make the selected elements to be the same size

■ **Zoom Toolbar**



Table. 2.5.7 Zoom toolbar

Icon	Function	Description
150%	Display Level	Lets the user set a zoom level, including 25%, 50%, 75%, 100%, 150%, 200% and 300%
	Zoom In	Lets the user change the magnification level, including 150%, 200% and 300%.

Icon	Function	Description
	Zoom Out	Lets the user reduce the magnification level, including 25%, 50% and 75%.
	1:1	Lets the user change element size to actual size (100%).

■ **Property Table**

Element property table. Please refer to Chapter 3 for detailed description.

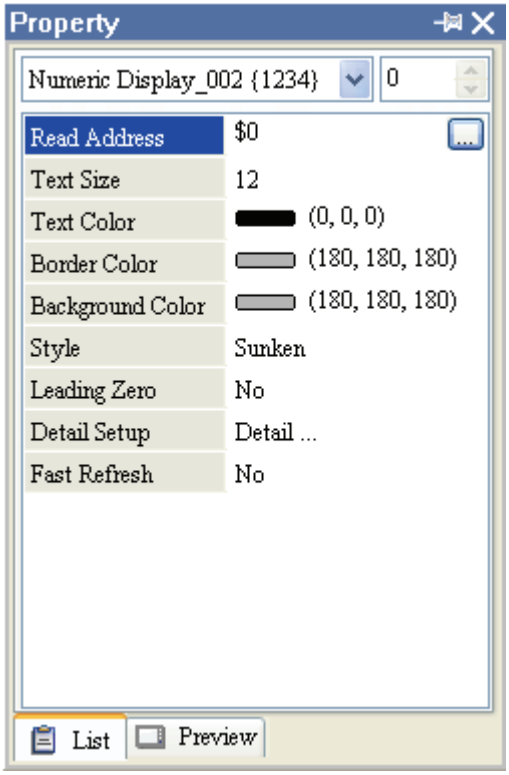


Fig. 2.5.3 Property table

■ **Output Window**

All editing processes during compile operation will be shown here for user's reference. It can let the user know the result of the compile operation and it is also convenient for tracing error address when creating and editing screen (See Fig. 2.5.4, Fig. 2.5.5, Fig. 2.5.6 and Fig. 2.5.7).

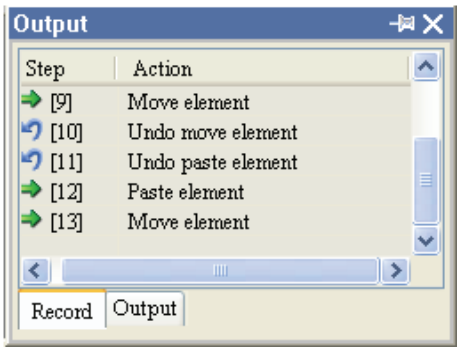


Fig. 2.5.4 Output window

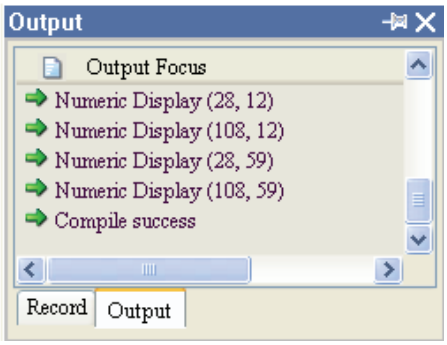


Fig. 2.5.5 Output window during compile operation

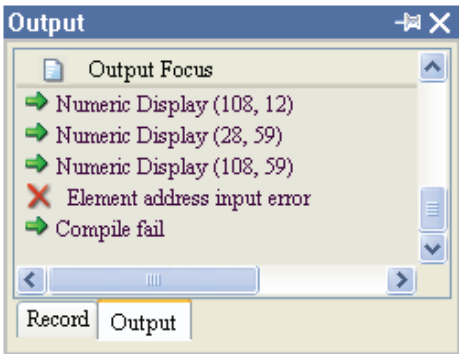


Fig. 2.5.6 Output result of compile operation

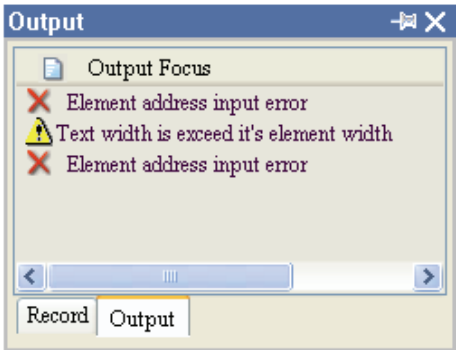


Fig. 2.5.7 Error output

■ Zoom In



Zoom in to get a close look at the elements on ScrEdit work place. (Refer to Fig. 2.5.8, Fig. 2.5.9)

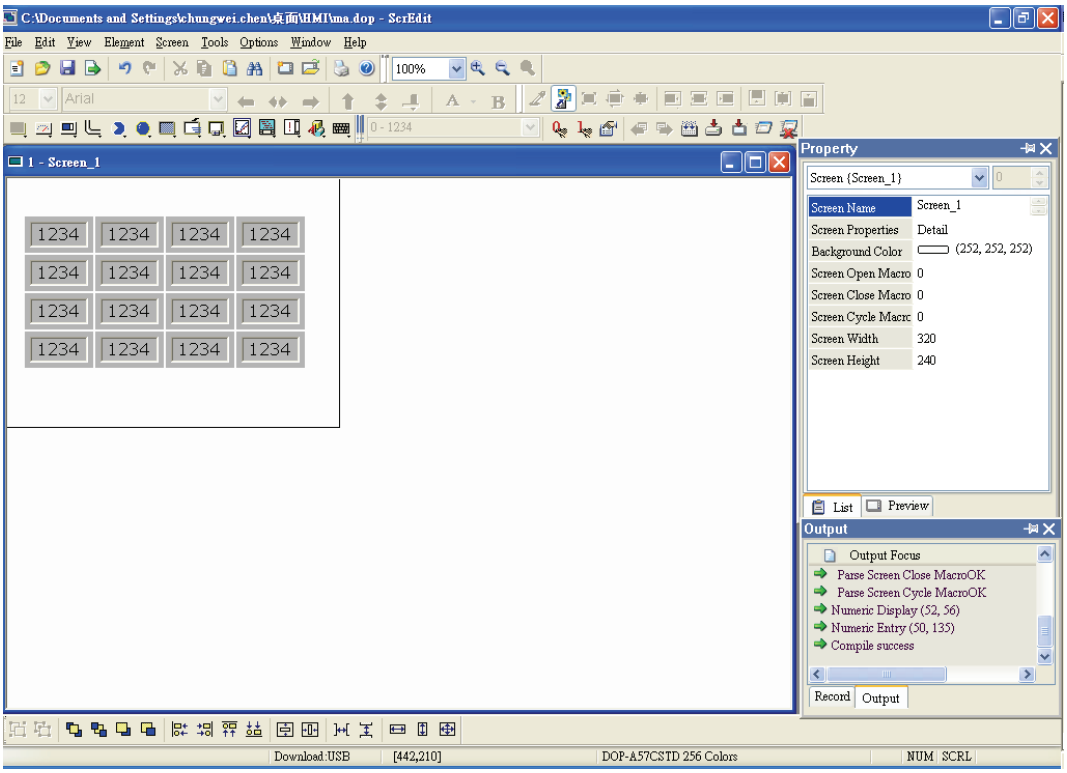


Fig. 2.5.8 Zoom level = 100% (Before Choosing Zoom In command)

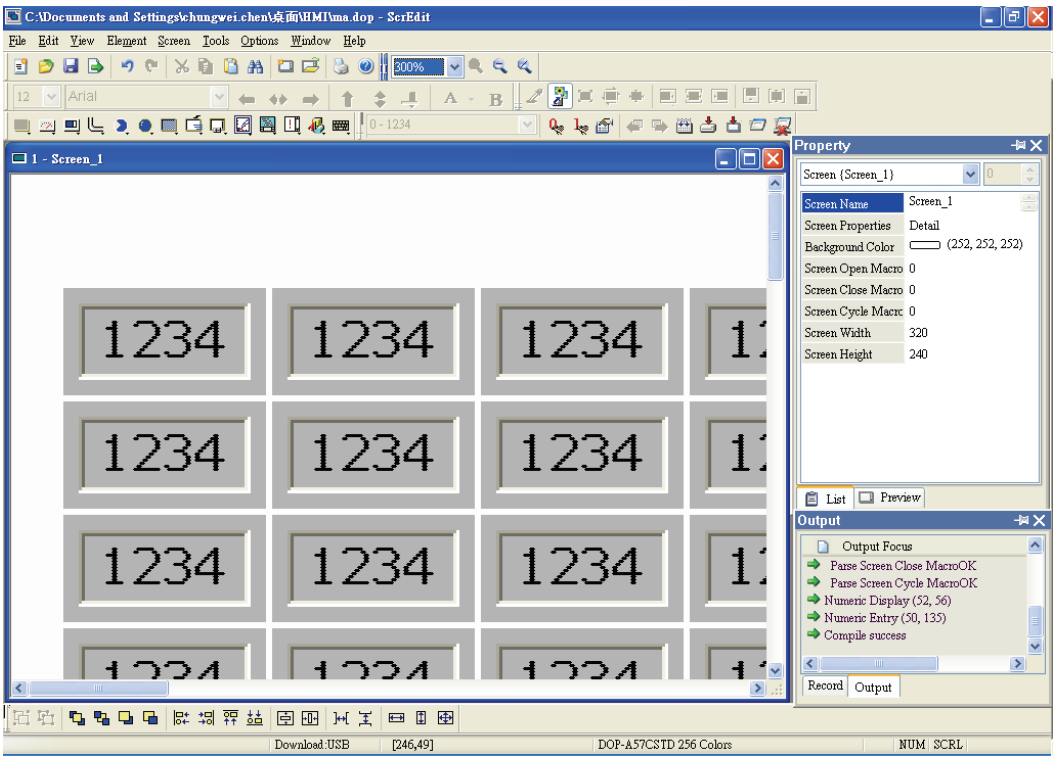


Fig. 2.5.9 Zoom level = 300% (After Choosing Zoom In command)

■ Zoom Out



Zoom out to see more look of the elements on ScrEdit work place. (Refer to Fig. 2.5.10)

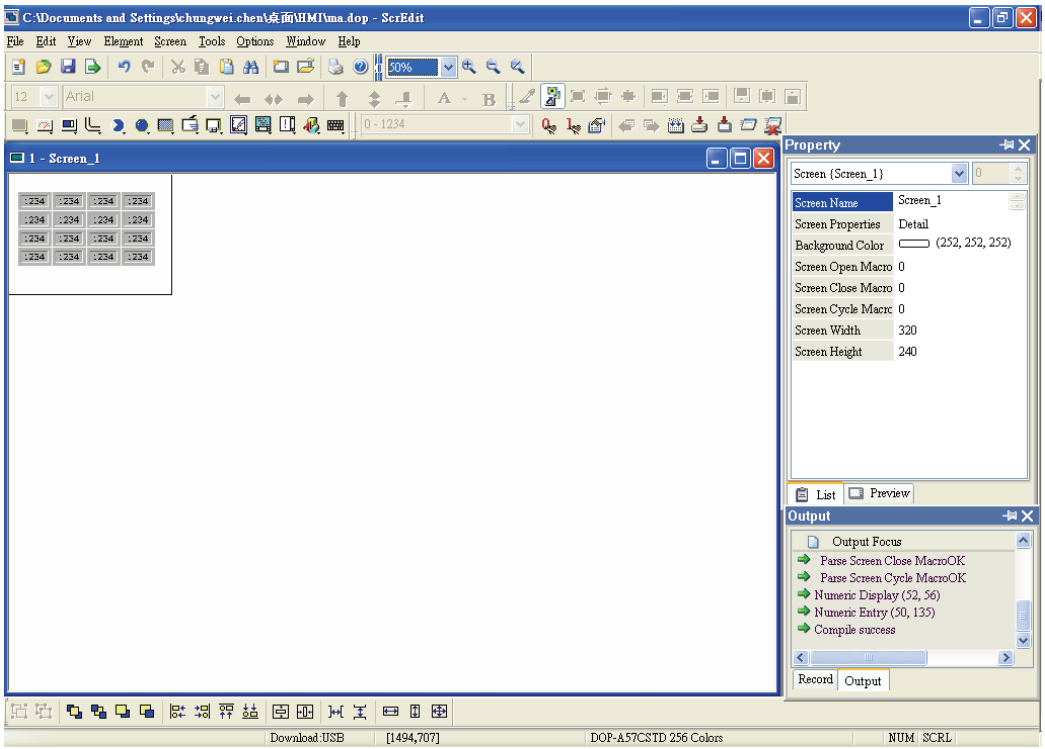


Fig. 2.5.10 Zoom level = 50% (After Choosing Zoom Out command)

■ Actual Size



Return to actual size (100%). This size is relative to the screen size of HMI.

The user can also zoom in or out by clicking icon  or  or selecting the Zoom level directly (Fig. 2.5.11).

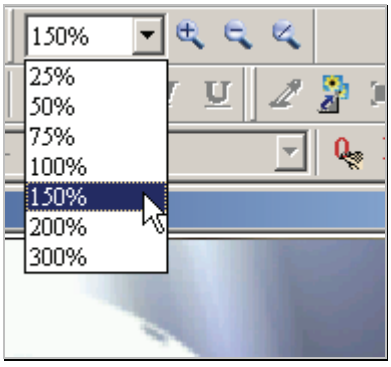
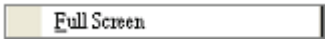


Fig. 2.5.11 Zoom level

■ Full Screen



As Fig. 2.5.12. Full screen provides maximum view to edit in ScrEdit. Full screen view will hide all toolbars and docking windows other than the ScrEdit work place itself. Fig. 2.5.12 full screen also shows the reference macro command.



Fig. 2.5.12 Full Screen (Pressing Esc key or left-click the mouse can exit Full screen)

■ I/O Screen

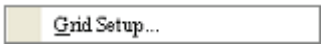


As Fig. 2.5.13. I/O screen also provides maximum view to edit in ScrEdit just like Full screen. But the difference is that I/O Screen will show the read and write addresses of the element and also shows the set macro commands.



Fig. 2.5.13 I/O Screen (Pressing Esc key or left-click the mouse can exit Full screen)

■ Grid Setup



Grid Setup is a function that can help the user to align and position the element more easily and precisely. The distance (spacing) between the grid dots can be set by the user freely (Fig. 2.5.14 and Fig. 2.5.15).

Show Grid: Show the grid dots on the screen.

Snap to Grid: Make the elements snap to grid so that the elements can jump between grid lines when the user moves them.

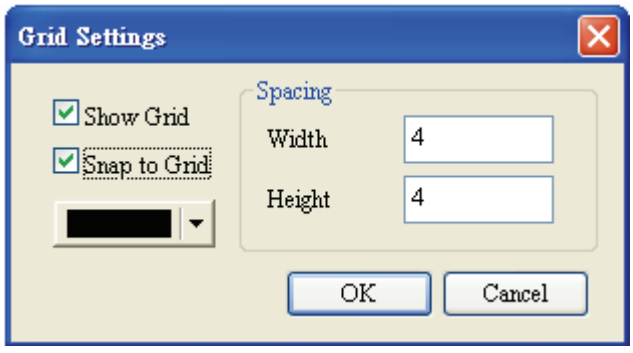


Fig. 2.5.14 Gird Settings dialog box

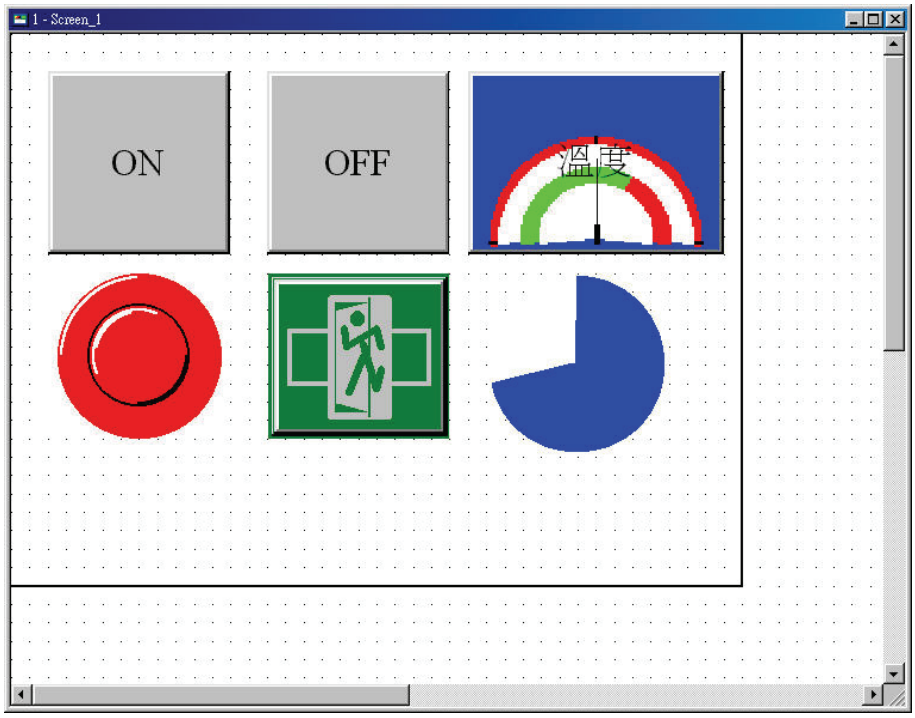


Fig. 2.5.15 Show Gird screen

2.6 Menu Bar and Toolbar (Element)

■ Element

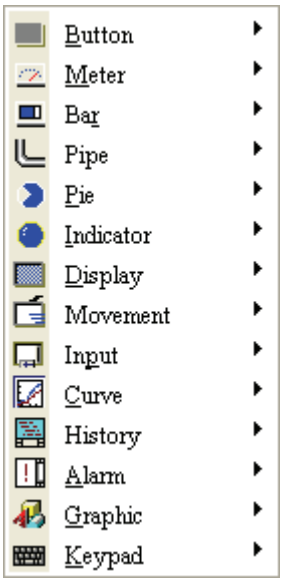


Fig. 2.6.1 Element options

Screen editor provides 14 types of elements and there are many styles for each type. These 14 types include Button, Meter, Bar, Pipe, Pie, Indicator, Display (data display), Movement (graph display), input, curve, history (sampling), alarm, graphic and, keypad, etc. The user can select a desired element from the pull-down menu and drag the size needed on ScrEdit work place (as Fig. 2.6.2 and Fig. 2.6.3).

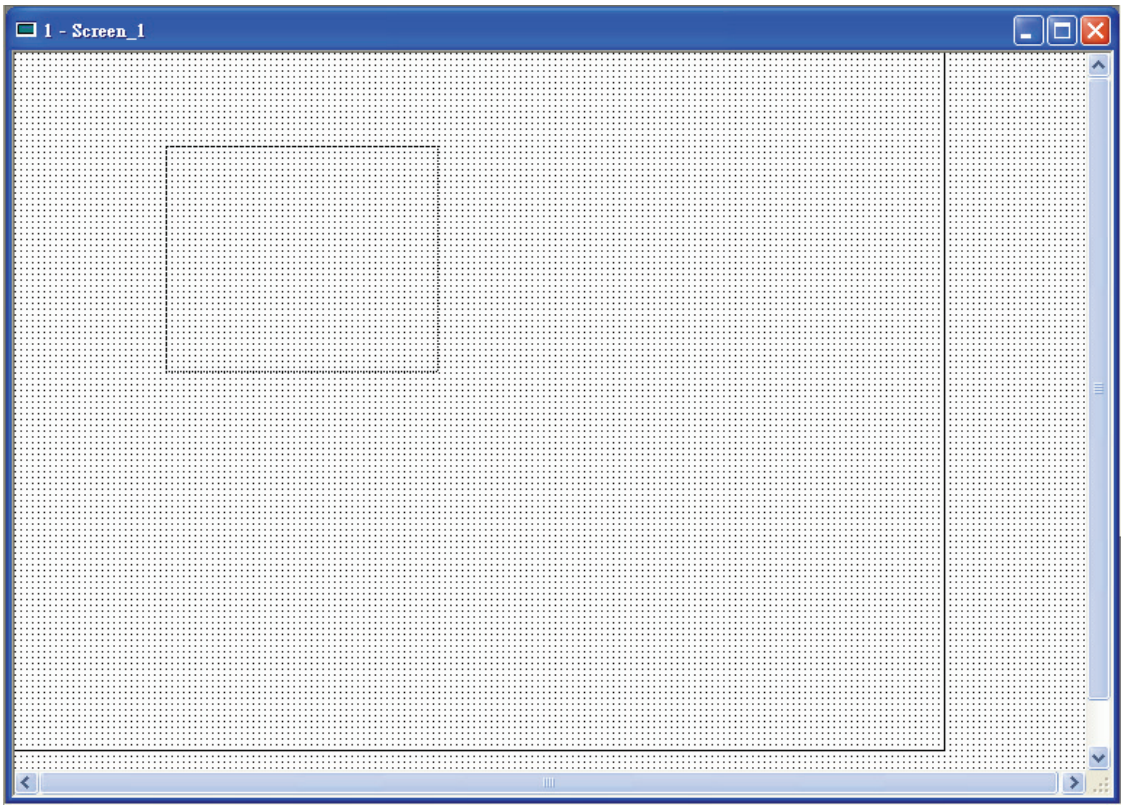


Fig. 2.6.2 Drag mouse to determine the element size

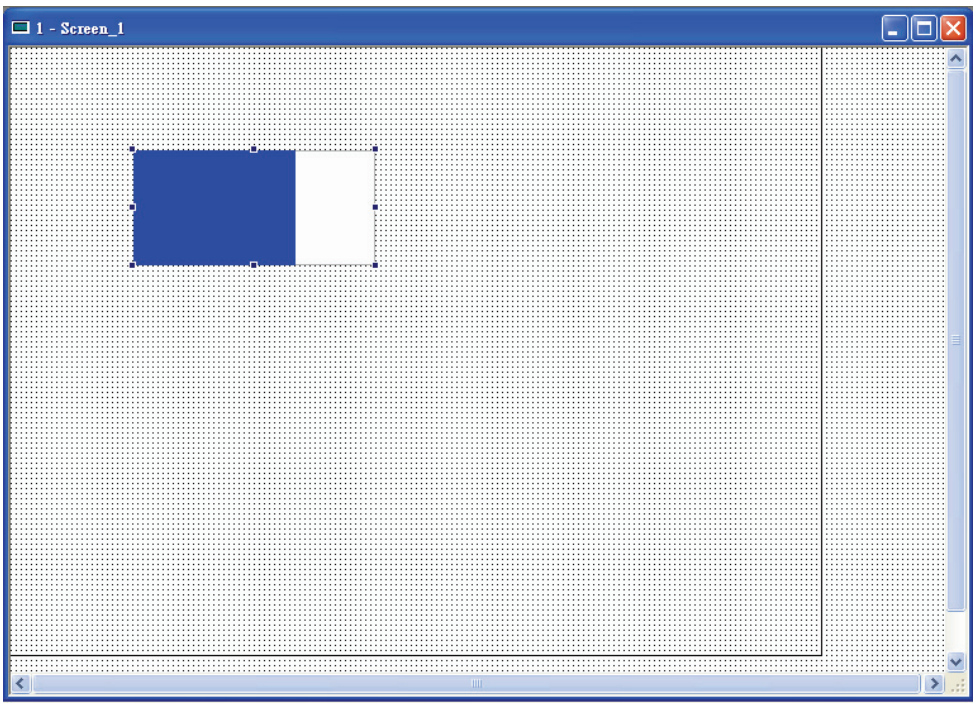


Fig. 2.6.3 Element display (Create an element)

The user can also right-click the mouse to select the desired element. For the property of each element, please refer to Chapter 3 for detailed description.

■ **Create an Element**

The user can select an element by right-clicking the mouse in work place. Place your mouse pointer in work place and right-click the mouse to get pull-down menu. Then, the user can select the desired element and determine the element size by left-clicking the mouse. Later set the property of the element (Fig. 2.6.4, Fig. 2.6.5, Fig. 2.6.6 and Fig. 2.6.7).

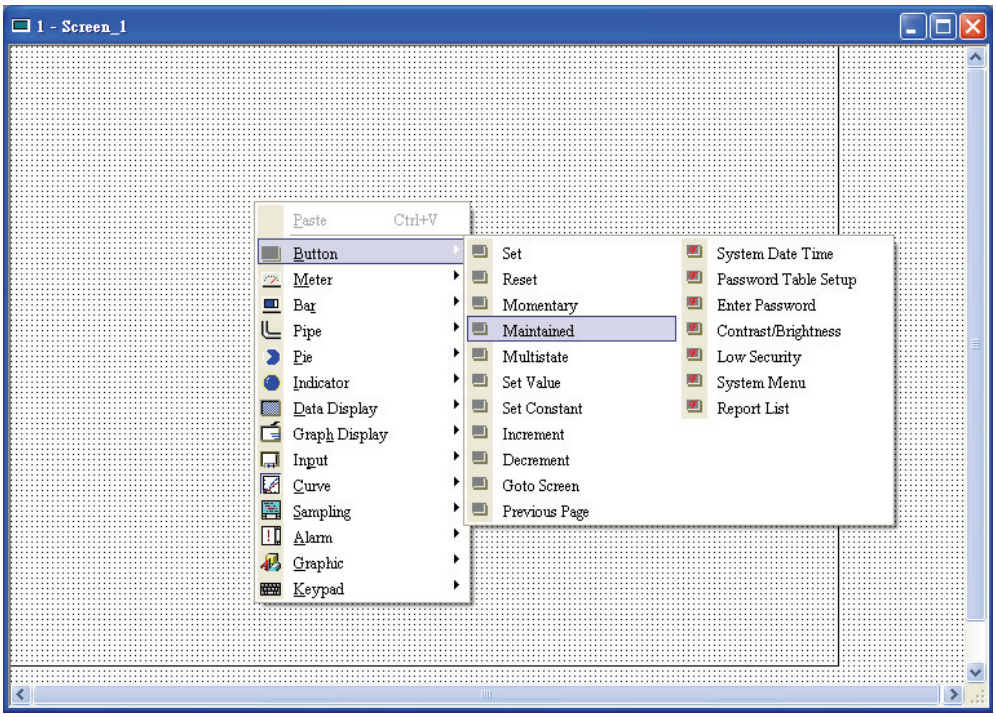


Fig. 2.6.4 Right-click the mouse to select the element

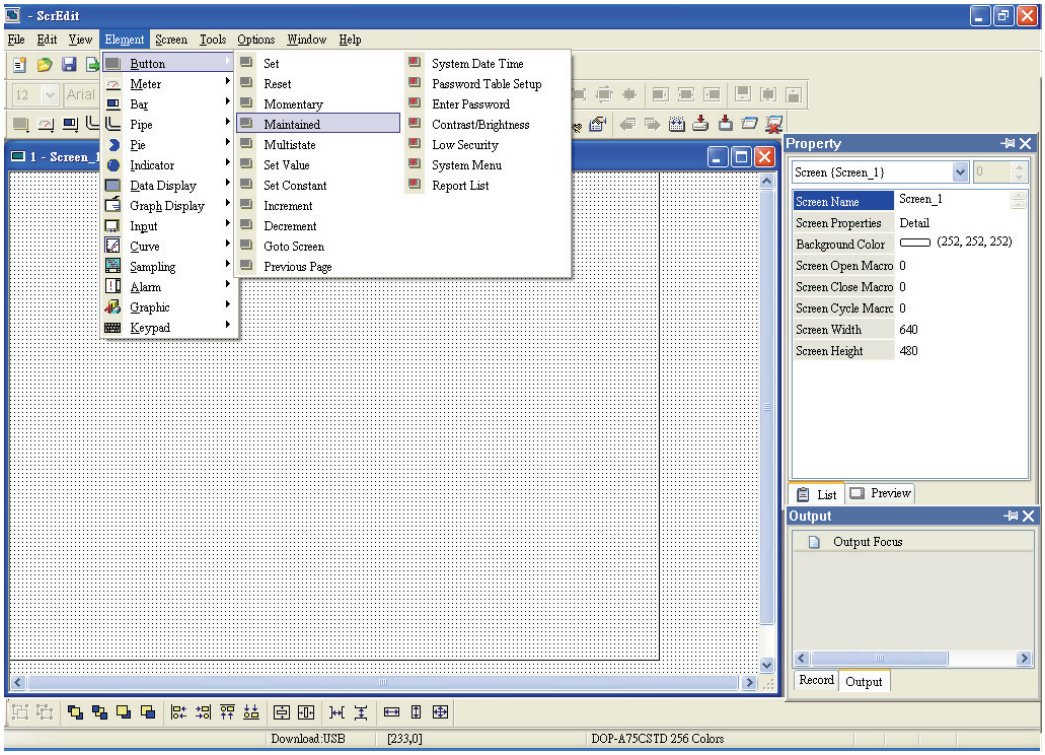


Fig. 2.6.5 Select an element by choosing Element command from menu bar

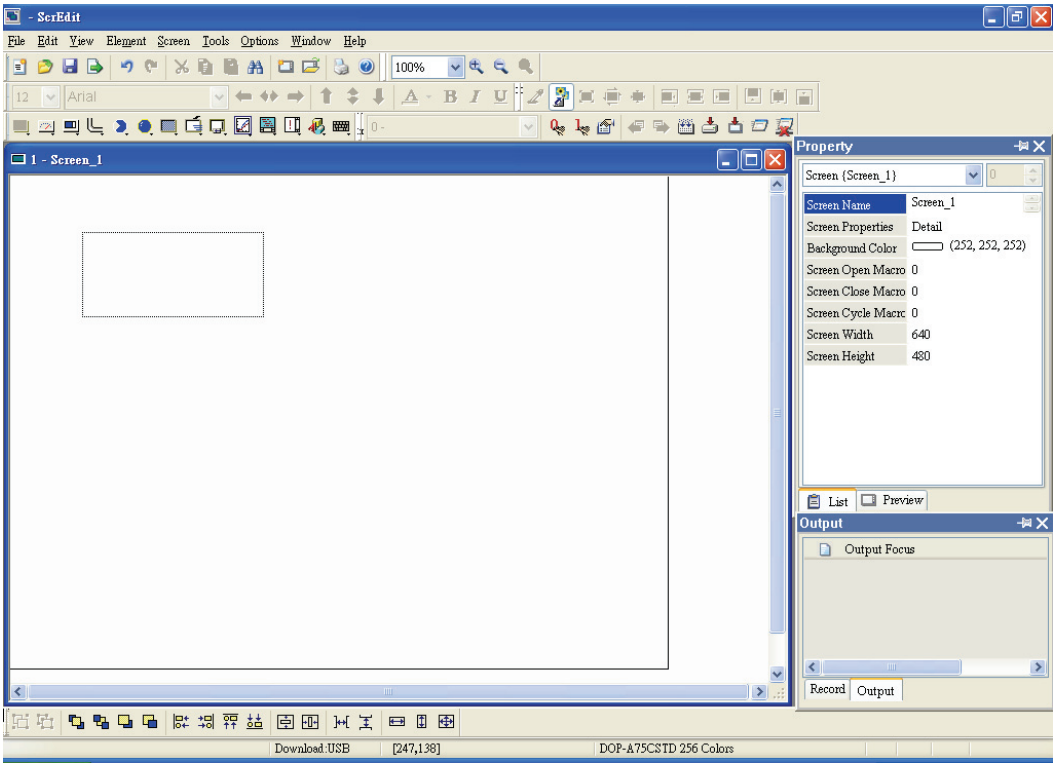


Fig. 2.6.6 Drag with left mouse button (Left-click the mouse, hold it to drag and release it to finish)

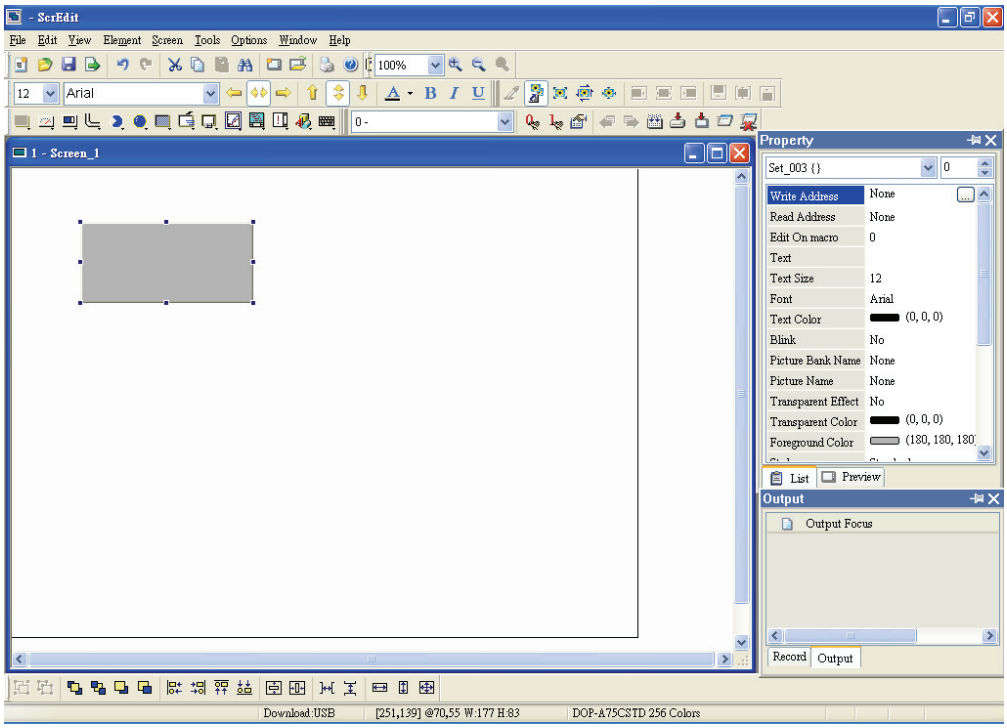


Fig. 2.6.7 Release left mouse button to create an element

■ Move an Element

The user can use the mouse to move an element. Mouse operation is the same as working in **Windows®** operating system. When the mouse cursor changes to a four-arrow icon ✣, the user can left-click the mouse and move the element freely (Fig. 2.6.8).

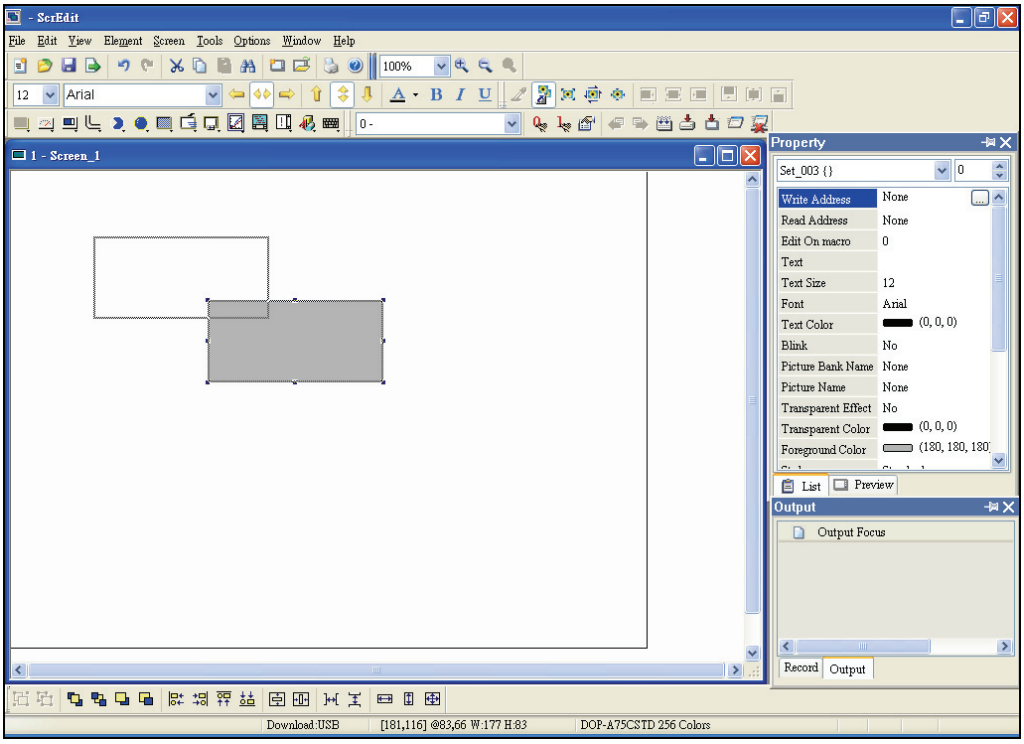


Fig. 2.6.8 Move an Element

■ Modify Element Width

The user can also use the mouse to modify the width of an element. When the mouse cursor changes to a two-arrow icon ↔, the user can left-click the mouse and modify the element width (Fig. 2.6.9).

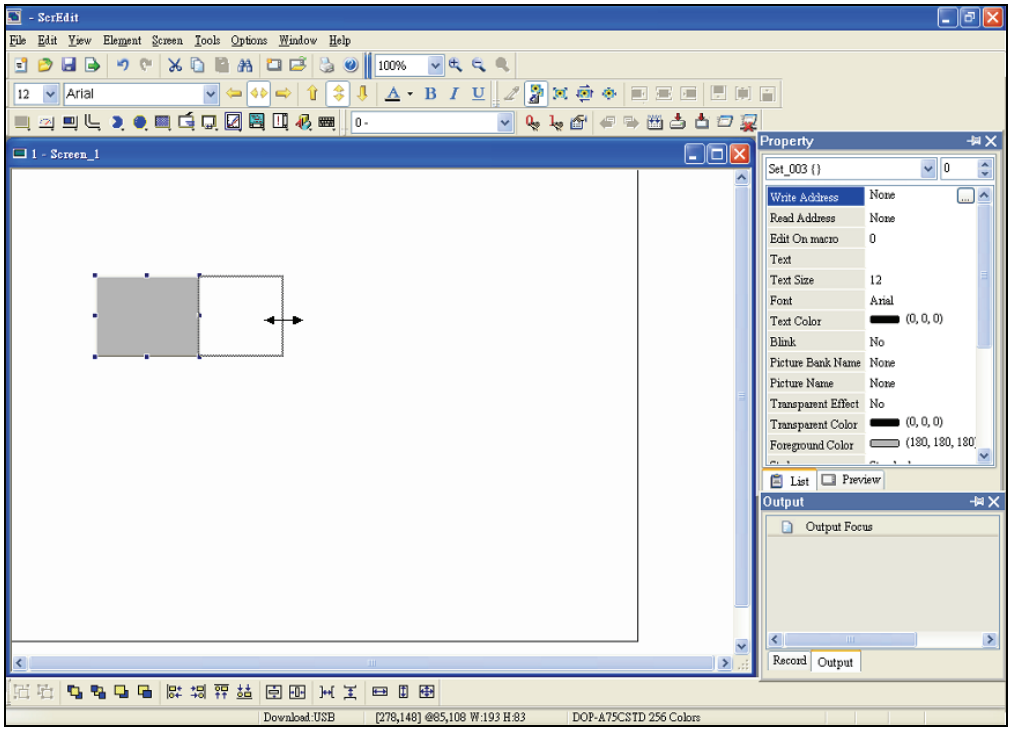


Fig. 2.6.9 Modify Element Width

■ Modify Element Height

The user can also use the mouse to modify the height of an element. When the mouse cursor changes to a two-arrow icon ↕, the user can left-click the mouse and modify the element height (Fig. 2.6.10).

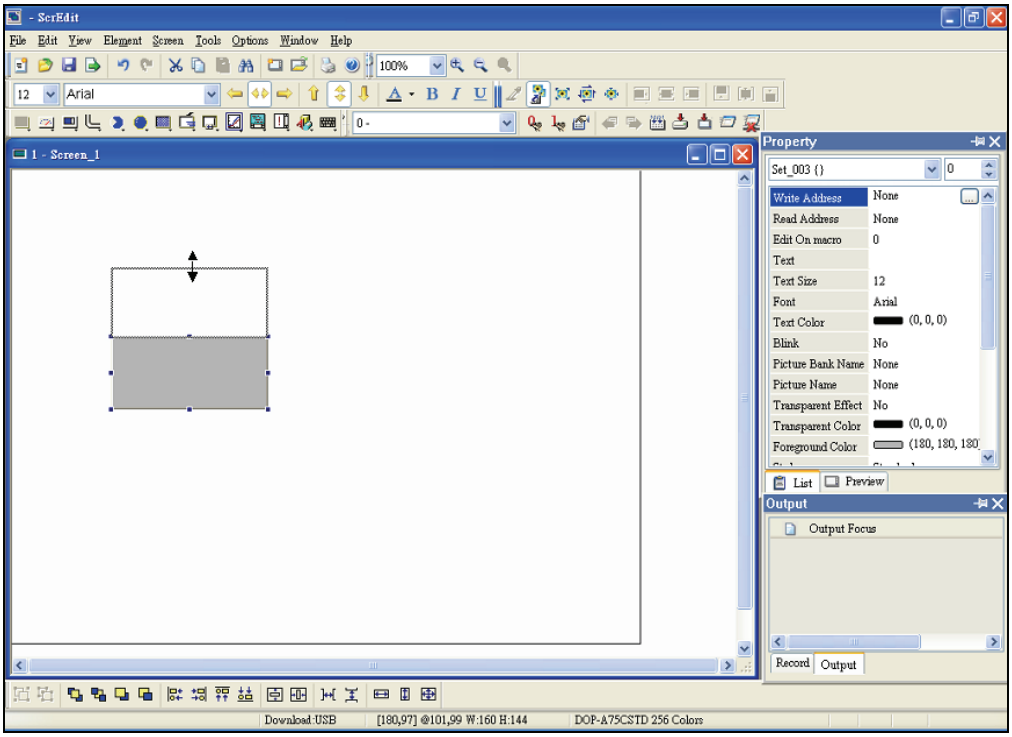


Fig. 2.6.10 Modify Element Height

■ Modify Element Width and Height Simultaneously

The user can also use the mouse to modify the width and height of an element simultaneously. When the mouse cursor changes to a two-arrow icon ⤢ or ⤡, the user can left-click the mouse and modify the element width and height at the same time (Fig. 2.6.11).

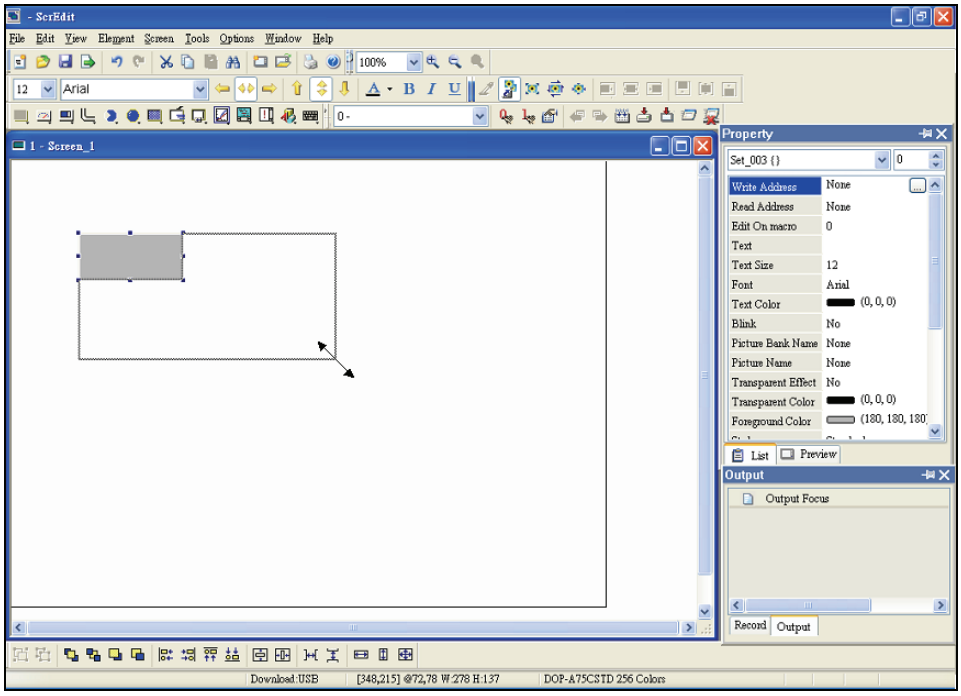


Fig. 2.6.11 Modify Element Width and Height Simultaneously

■ Input Characters

The user can input a string of characters that **Windows®** operating system accepts in the property table. When the mouse cursor changes to an icon I, the user can start to input any characters that **Windows®** operating system accepts where the cursor | blinks (Fig. 2.6.12).

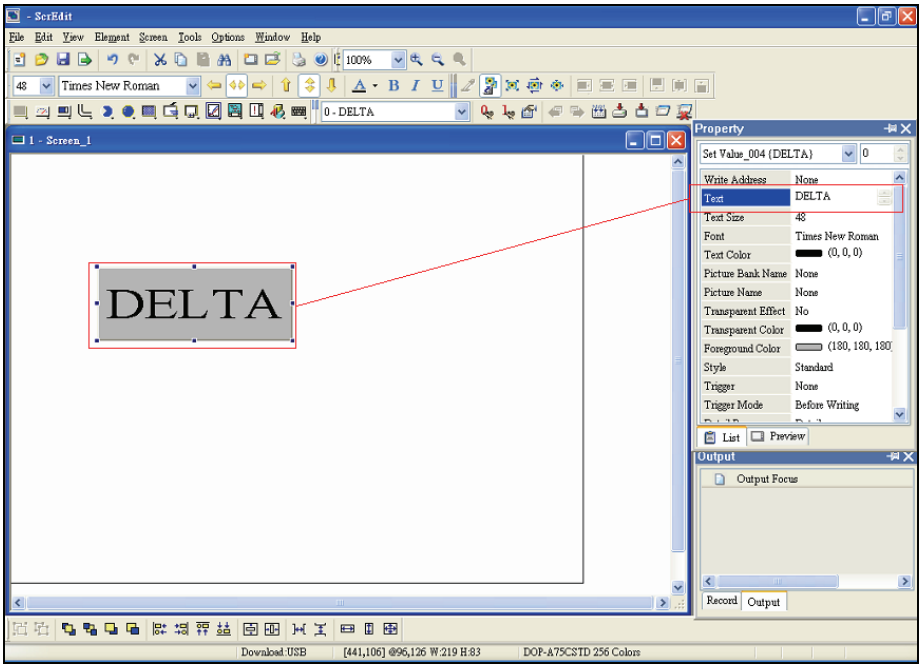


Fig. 2.6.12 Input Characters

■ Right-click the Mouse

The user can find that different menu will pop up when right-clicking the mouse (Fig. 2.6.13, Fig. 2.6.14 and Fig. 2.6.15).

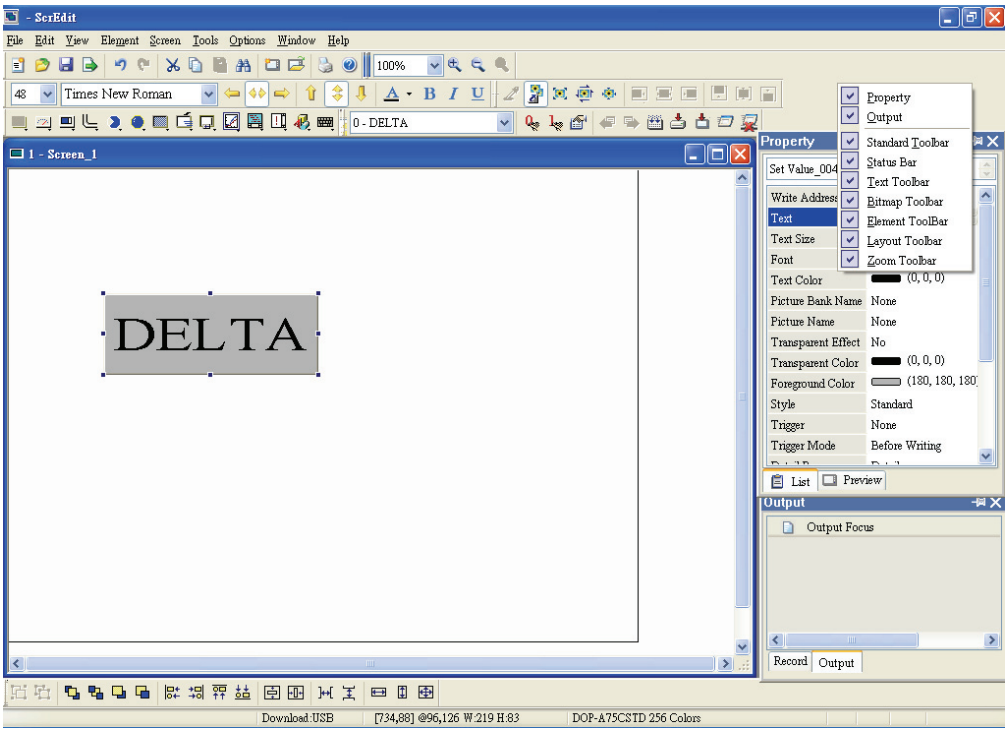


Fig. 2.6.13 Right-click the mouse on Toolbar - Toolbars window

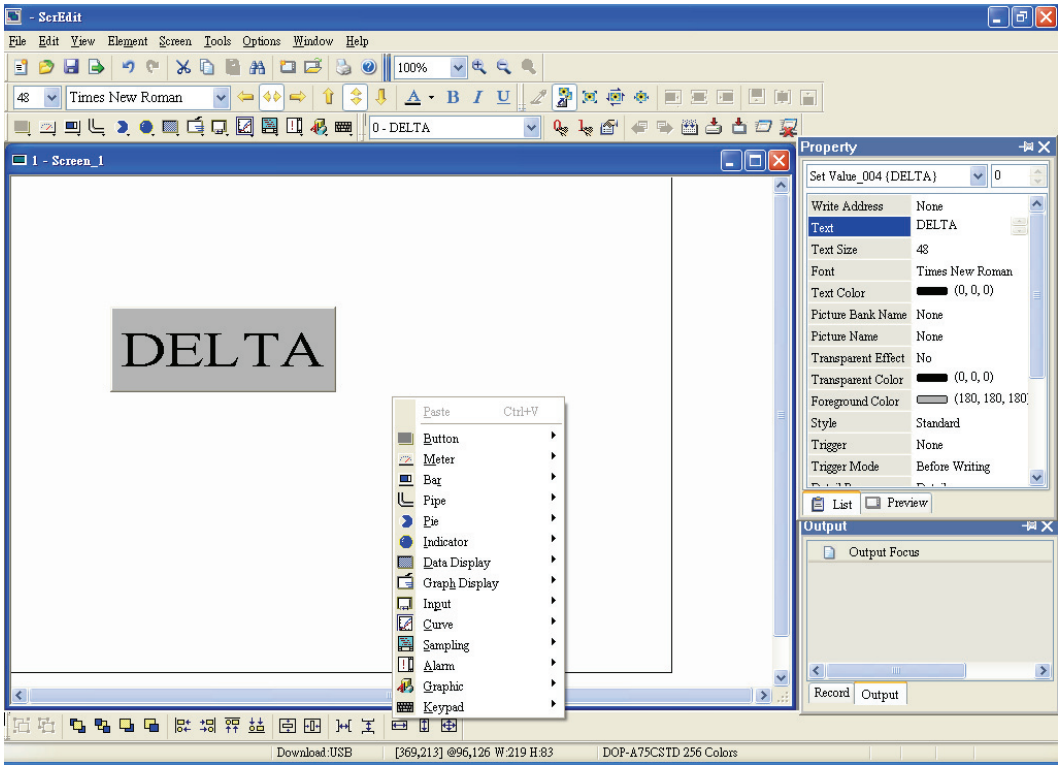


Fig. 2.6.14 Right-click the mouse in Work Place - Element Selection

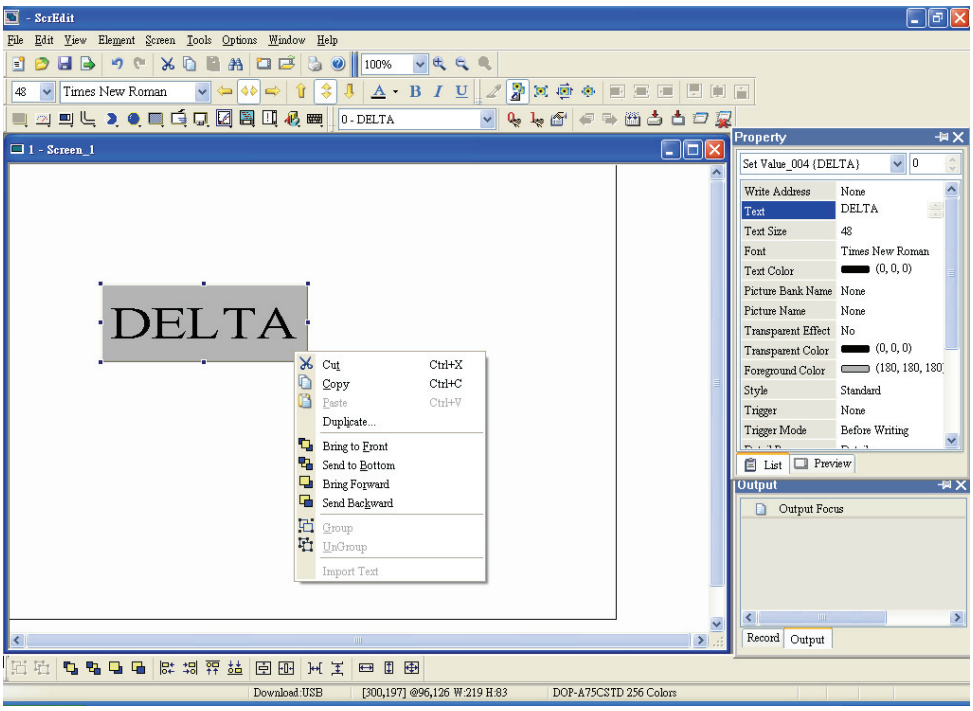
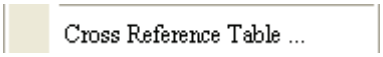


Fig. 2.6.15 Right-click the mouse on the element - Editing options (Layout Toolbar)

■ Cross Reference Table



When creating and editing various kinds of elements, what usually happens is that the repeat use of the same address. In order to avoid this situation, ScrEdit provides the cross reference table function for the user's convenience and quick reference. The user can view the read and write addresses of the selected element and see their relationship or connection with the addresses of other elements, macro commands or system control area. The user can see how to choose **Cross Reference Table** command from menu bar. Fig. 2.6.16 is one simple example to introduce the usage of this function. The first row of the cross reference table displays the referred element the user selected and the other rows below the first row displays the elements which have the same write address. The user can double-click the row and ScrEdit will switch to the corresponding screen of the referred address automatically. In Fig.2.6.16, ScrEdit switches to the corresponding screen of the referred address automatically and select the reference element.

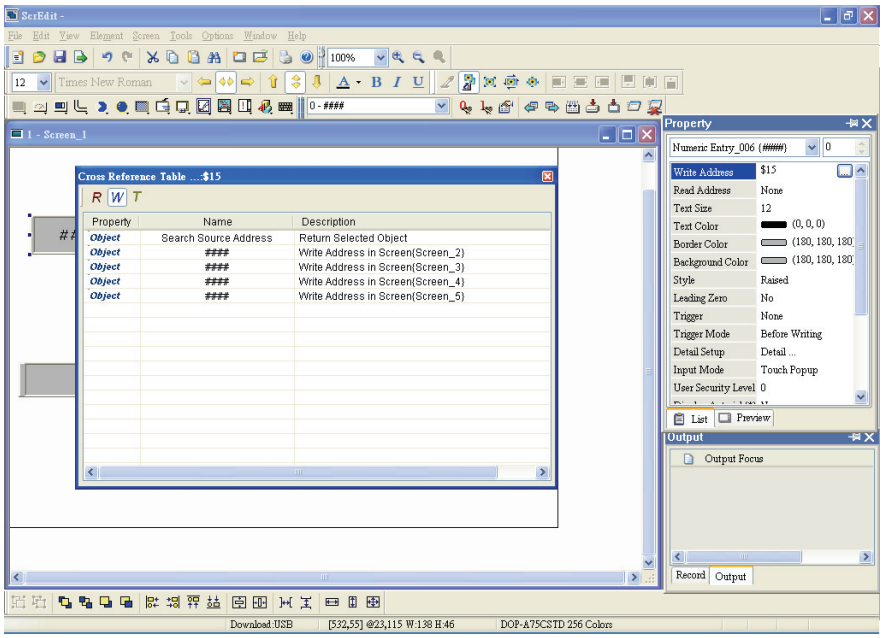
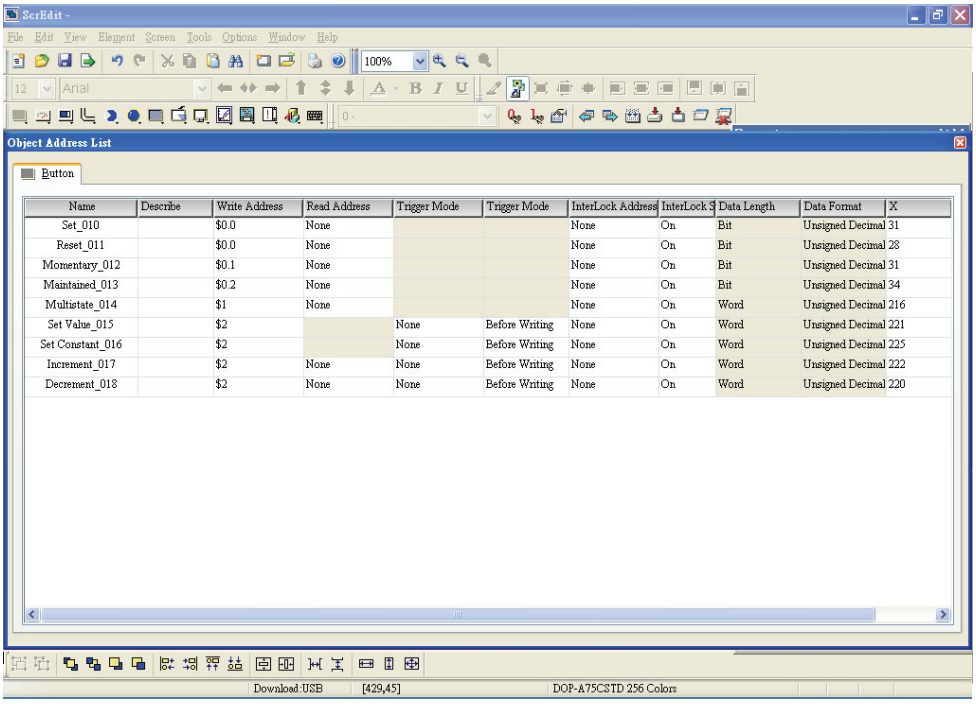


Fig. 2.6.16 Cross Reference Table dialog box

■ Element Part List



When **Element Part List** function is enabled, ScrEdit will sort out and classify all the elements on the current screen. The user can click the tab to switch to the classification that the user wants to view. The related addresses and corresponding properties will be listed in each classification (Name, Describe, Write / Read address, Trigger address, Trigger type, Interlock and Level) in each tab (Fig. 2.6.17). The user can double-click the column to let ScrEdit select the element automatically and allow the user to edit the detailed property of the selected element in property table.



Name	Describe	Write Address	Read Address	Trigger Mode	Trigger Mode	InterLock Address	InterLock 3	Data Length	Data Format	X
Set_010		$0.0	None			None	On	Bit	Unsigned Decimal	31
Reset_011		$0.0	None			None	On	Bit	Unsigned Decimal	28
Momentary_012		$0.1	None			None	On	Bit	Unsigned Decimal	31
Maintained_013		$0.2	None			None	On	Bit	Unsigned Decimal	34
Multistate_014		$1	None			None	On	Word	Unsigned Decimal	216
Set Value_015		$2		None	Before Writing	None	On	Word	Unsigned Decimal	221
Set Constant_016		$2		None	Before Writing	None	On	Word	Unsigned Decimal	225
Increment_017		$2	None	None	Before Writing	None	On	Word	Unsigned Decimal	222
Decrement_018		$2	None	None	Before Writing	None	On	Word	Unsigned Decimal	220

Fig. 2.6.17 Element Part List dialog box

2.7 Menu Bar and Toolbar (Screen)

■ Screen

In Screen options, ScrEdit provides some screen editing functions (Fig. 2.7.1). Please refer to the following sections for more detailed introduction.

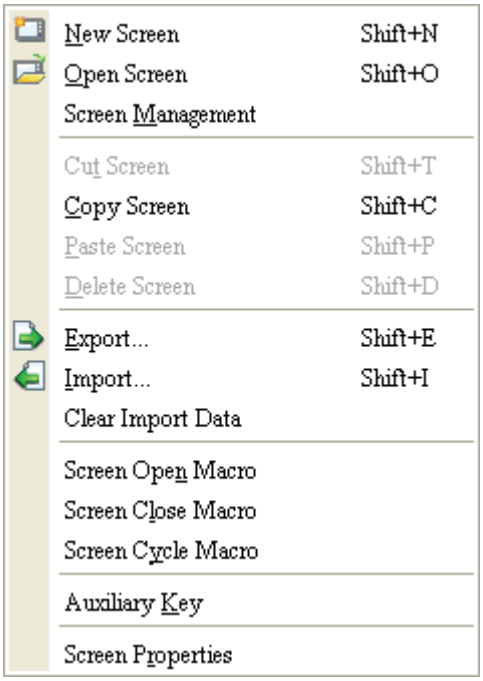


Fig. 2.7.1 Screen options

If the user presses the close box, it will hide the current screen without exiting. In Windows, it will exit the current screen by clicking close box and remind the user to save before exiting. However, in ScrEdit environment, the current screen will not be deleted and it will not remind the user to save. The function of clicking the close box only hides the current screen.

■ New Screen



Create a new screen. The user can choose **Screen > New Screen** or click the New Screen icon , or use keyboard shortcuts by pressing **Shift + N** to open a new editing screen. The new screen can be named and numbered by the user. The setting dialog box is shown as Fig. 2.7.2.

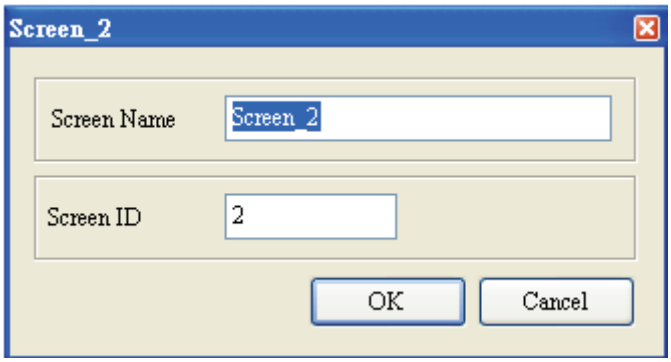


Fig. 2.7.2 New Screen dialog box

■ Open Screen



Open an old screen. The user can choose **Screen > Open Screen** or click the Open Screen icon , or use keyboard shortcuts by pressing **Shift + O**. When choosing open screen, the user can preview each screen in Open Screen dialog box (Fig. 2.7.3).

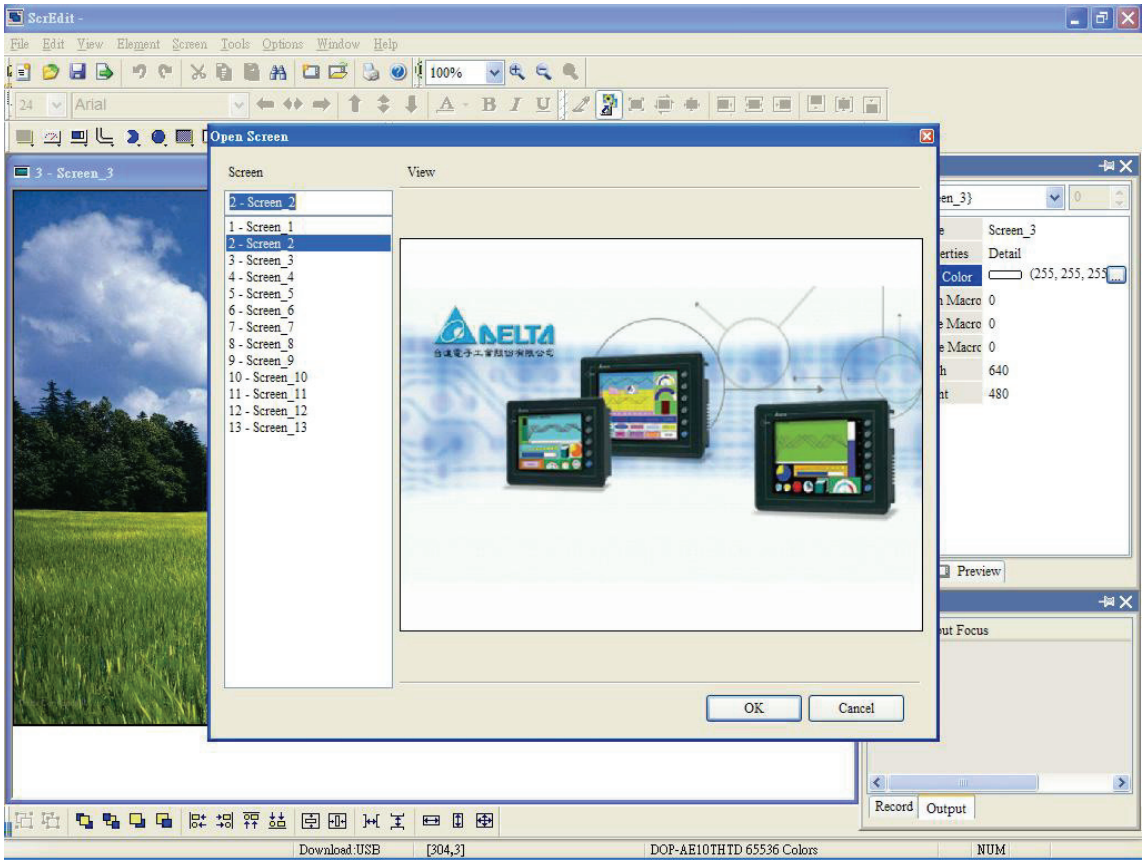


Fig. 2.7.3 Open Screen dialog box

■ Screen Management



When **Screen Management** function is enabled (Fig. 2.7.4), the user can duplicate, paste and cut the screen using the mouse, just like the function of Windows Explorer in **Windows®** operating system. In Screen Management dialog box, the user can right click the mouse to manage all of the screens (Fig. 2.7.5). Please note that the user cannot undo the action of cut screen. It is the same as delete screen that screen will be lost but it can be pasted to get the same screen (Fig. 2.7.6). Besides, right-click the mouse to select the **Edit Save Screen** function, and then the user can drag the mouse to determine the screen saver display (Fig. 2.7.7). For the setting of screen saver, please click **Options > Configuration > Other**.

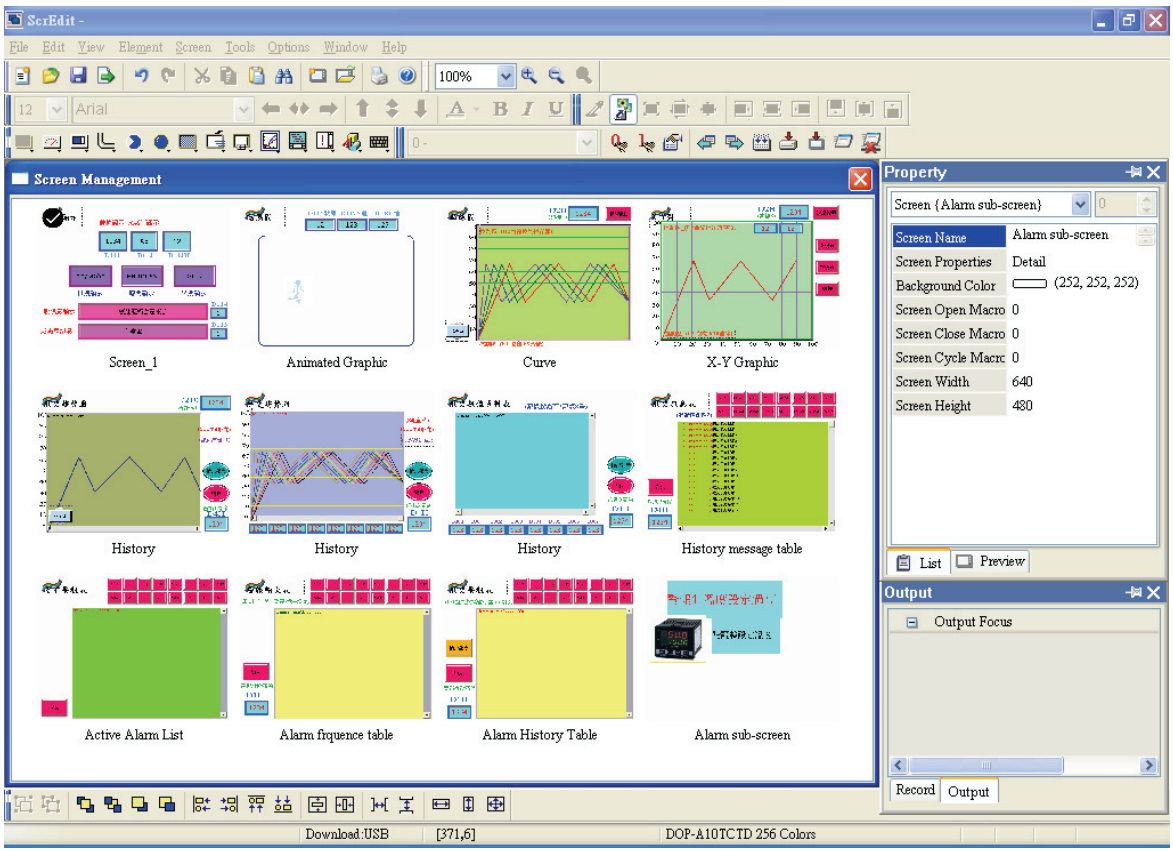


Fig. 2.7.4 Screen Management dialog box

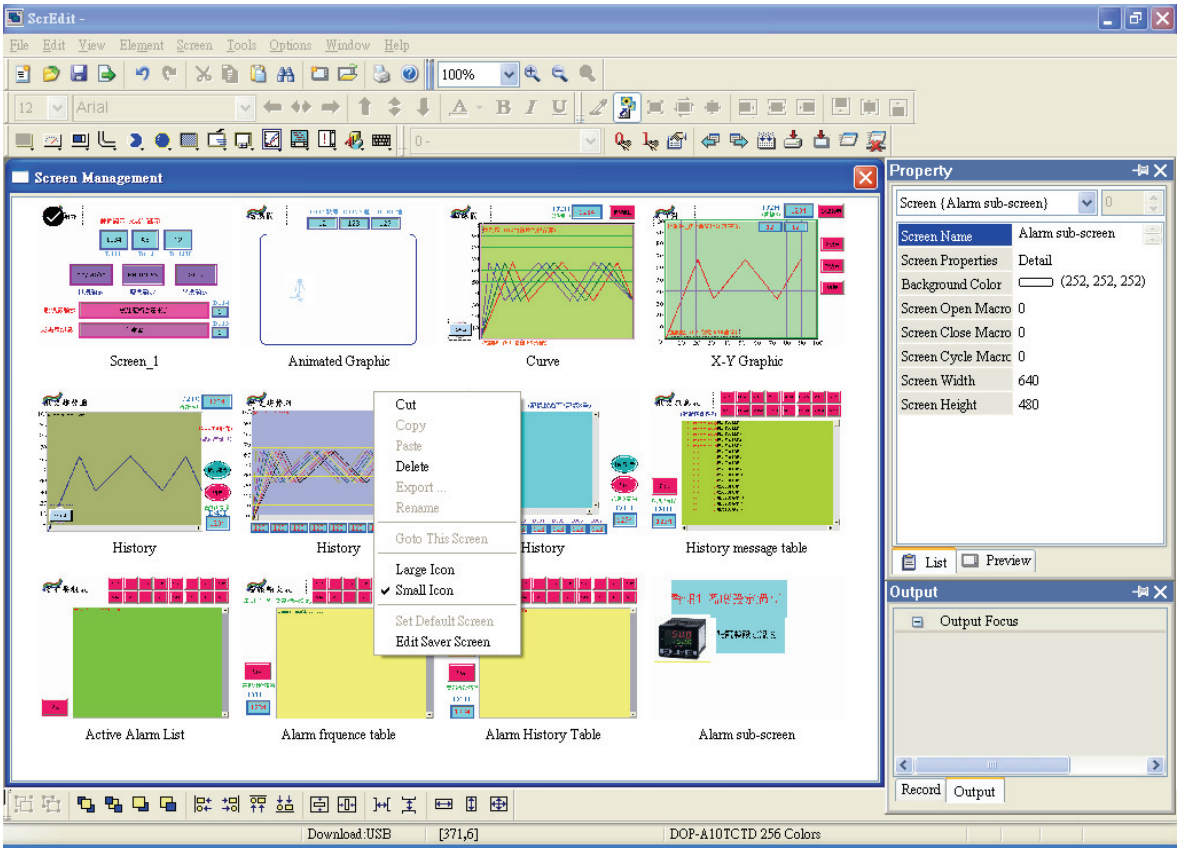


Fig. 2.7.5 Right-click the mouse

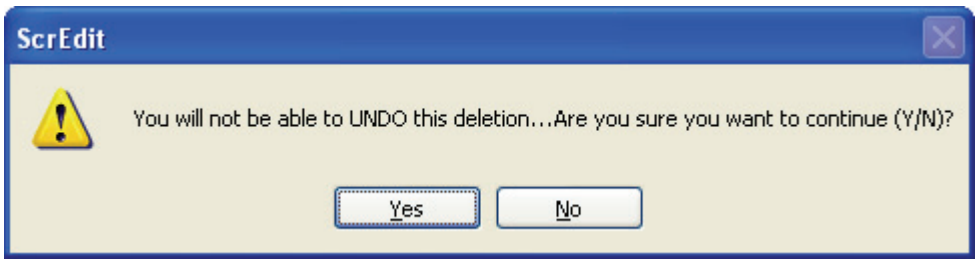


Fig. 2.7.6 Warning message after screen is cut

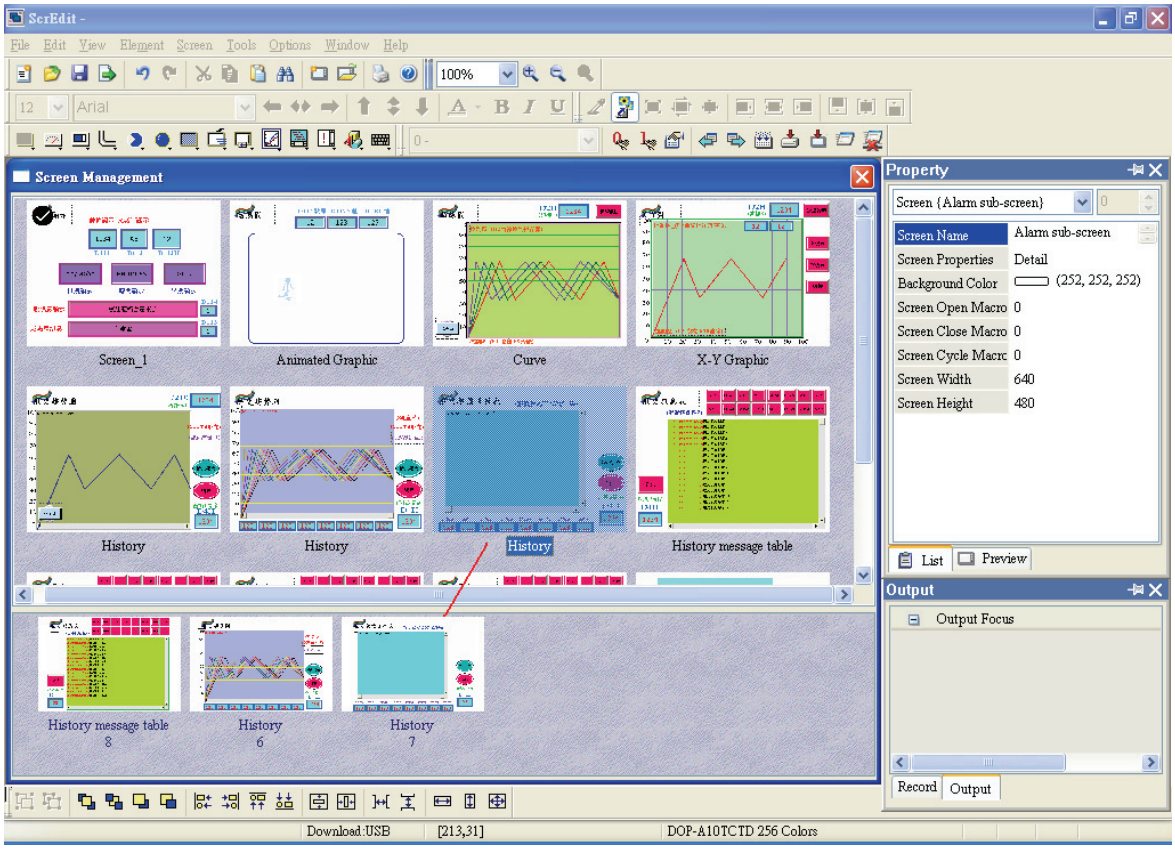


Fig. 2.7.7 Drag the mouse to determine the screen saver display

■ Cut Screen



Cut whole screen to clipboard, just like the Microsoft Office Clipboard function. The difference is that Microsoft Office Clipboard allows the user to cut text and graphic items and the Cut Screen function only allows the user to cut a whole screen. The user can execute this function by choosing **Screen > Cut Screen**, or use keyboard shortcuts by pressing **Shift + T**.

Please note that the user cannot undo the action of cut screen. It is the same as delete screen that screen will be lost but it can be pasted to get the same screen (Fig.2.7.8).

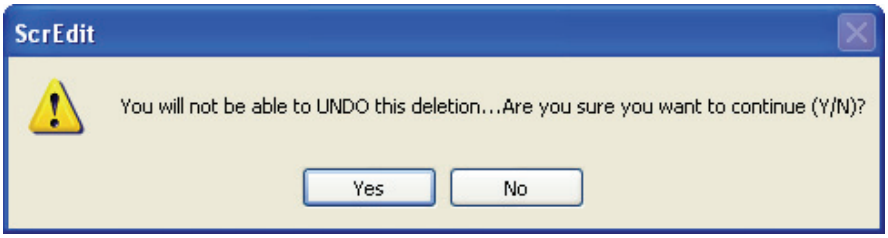


Fig. 2.7.8 Cut Screen message

■ Copy Screen



Copy whole screen. The user can execute this function by clicking **Screen > Copy Screen** or use keyboard shortcuts by pressing **Shift + C**.

■ Paste Screen



The user can paste a screen by clicking **Screen > Paste Screen** or use keyboard shortcuts by pressing **Shift + P**. All screen setting will be the same as original screen after pasting but the screen number will be given automatically by ScrEdit.

■ Delete Screen



Delete the current editing screen or element. The user can delete a screen by clicking **Screen > Delete Screen** or use keyboard shortcuts by pressing **Shift + D**.

Please note that after executing Delete Screen, the user cannot undo the action of delete screen (Fig.2.7.9).

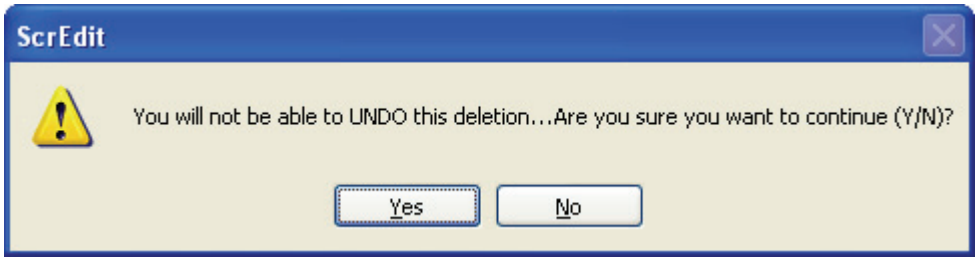


Fig. 2.7.9 Delete Screen Message

■ Export



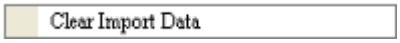
Export an project to BMP format. The user can execute this function by clicking **Screen > Export** or clicking the Export icon , or use keyboard shortcuts by pressing **Shift + E**.

■ Import



Import a picture to be the background of the editing screen. Please note that this background of the editing screen is different than the base screen. The nature of an imported picture differs greatly from that of the base screen. The imported picture cannot exist in ScrEdit as an element. However, the base screen can be regarded as an element and then exist in the editing screen after a compile operation is completed (The definition and usage of the base screen will be introduced more in the section of “Screen Properties”). The file types of available imported picture can be BMP, JPG and GIF, etc. The user can execute this function by clicking **Screen > Import** or use keyboard shortcuts by pressing **Shift + I**.

■ Clear Import Data



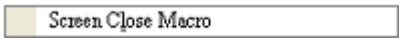
The user can free more disk space by clearing the imported data that the user does not want to use. Execute this function by clicking **Screen > Clear Import Data**.

■ Screen Open Macro



When **Screen Open Macro** function is selected, the Macro will be executed automatically once opening screen occurs. (Please refer to Chapter 4 for the usage and editing method of Macro.)

■ Screen Close Macro



When **Screen Close Macro** function is selected, the Macro will be executed automatically once the screen is closed. (Please refer to Chapter 4 for the usage and editing method of Macro.)

■ Screen Cycle Macro



When **Screen Cycle Macro** function is selected, the Macro will be executed continuously once the screen is displayed. (Macro will be executed continuously by the cycle time setting) (Please refer to Chapter 4 for the usage and editing method of Macro.)

The user also can click the Screen Open Macro, Screen Close Macro and Screen Cycle Macro options from the Property Table to enter intro Screen Open Marco editing environment (Fig. 2.3.10).

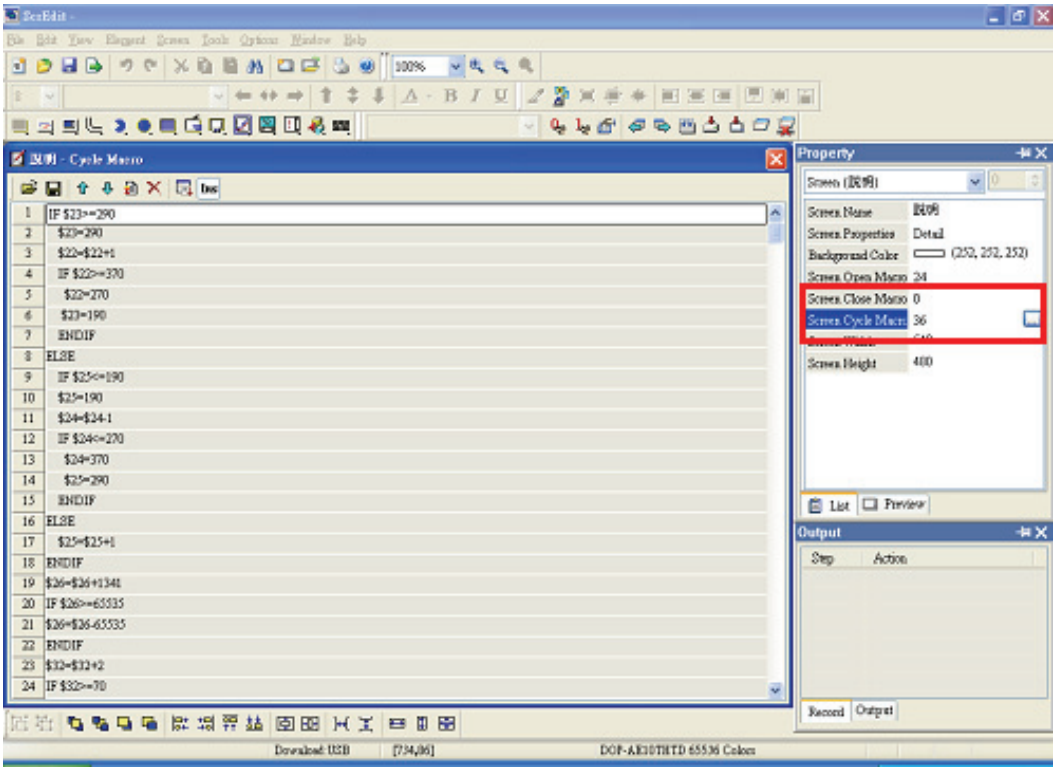


Fig. 2.7.10 Screen Open Marco editing environment

■ Auxiliary Key



DOP series HMI allows the user to determine the function of auxiliary keys in each screen. The user can execute this function by clicking **Screen > Auxiliary Key**. Auxiliary key set up for each screen can be completed by pressing the auxiliary keys on HMI panel (Fig. 2.7.11) or on the screen (Fig. 2.7.12).

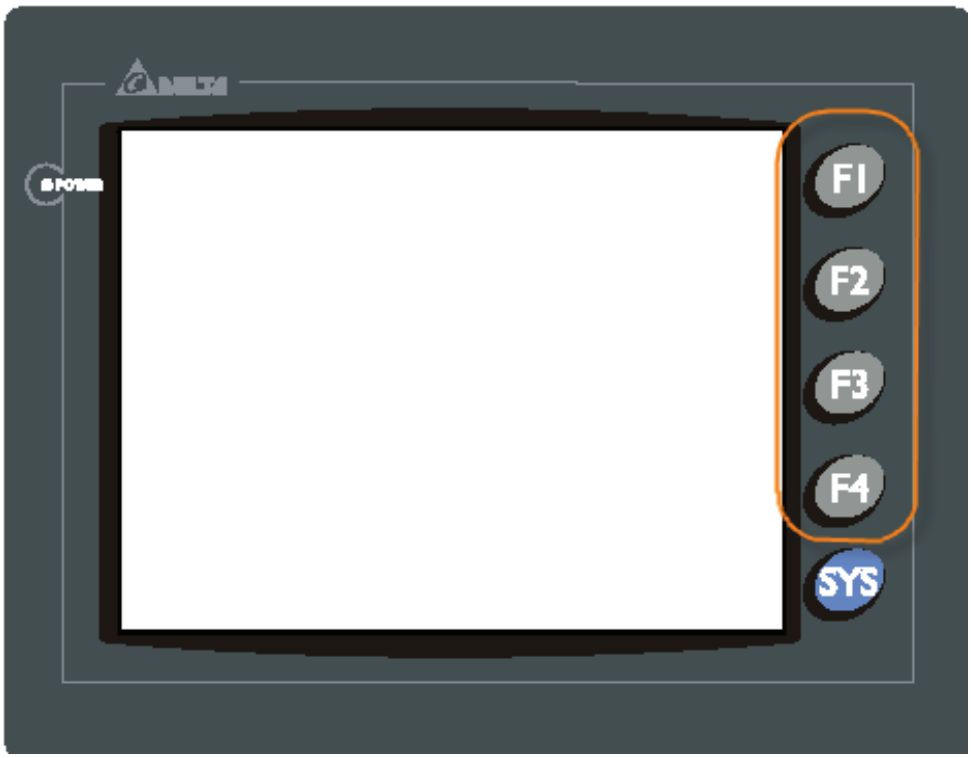


Fig. 2.7.11 Auxiliary Keys on HMI panel

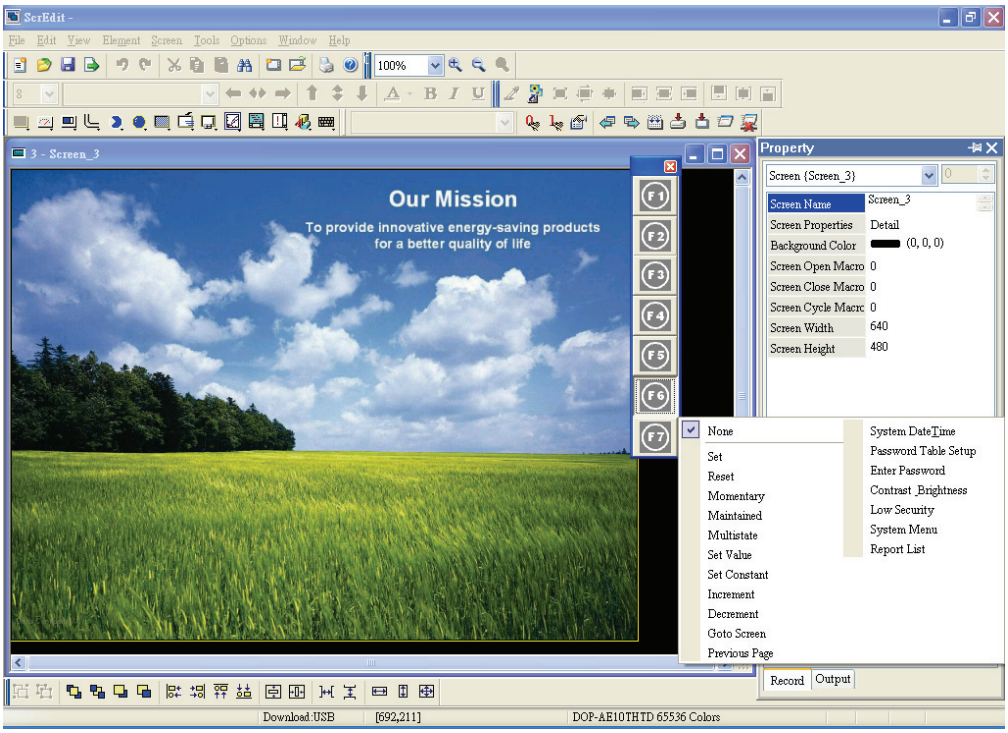


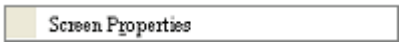
Fig. 2.7.12 Auxiliary Key setting on the screen

In Table 2.7.1, the user can see how many user-defined auxiliary keys are available for each model.

Table 2.7.1 Available user-defined auxiliary keys

DOP-A/AE/AS Series Model Name	Available User-defined Auxiliary Keys
DOP-AS38BSTD	4
DOP-A (E) 57BSTD	4
DOP-A (E) 57GSTD	4
DOP-A (E) 57CSTD	4
DOP-A75CSTD	6
DOP-AE80THTD	6
DOP-AE94BSTD	11
DOP-A10TCTD	7
DOP-AE10THTD	7

■ Screen Properties



The user can decide the properties of the current editing screen by clicking **Screen > Screen Properties** or choosing **Screen Properties** from docking windows to set the current screen (Fig. 2.7.13). For the setting of Screen Properties, please refer to Fig. 2.7.14 and Table 2.7.2.



Fig. 2.7.13 Choosing Screen Properties from docking windows

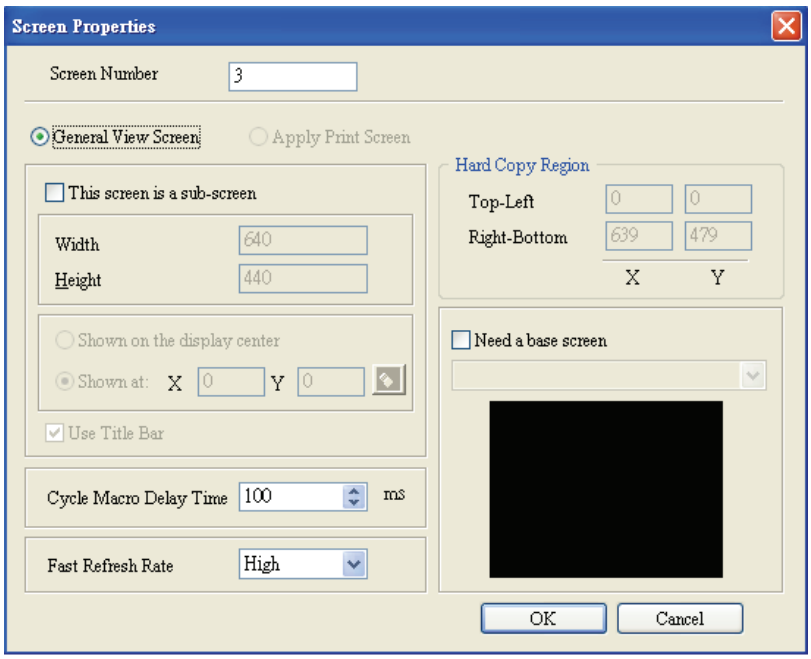


Fig. 2.7.14 Screen Properties dialog box

Table 2.7.2 Screen Properties setting

Function		Description
Screen Number		The screen number range is within 1~65535 and the number cannot be repeated.
Screen Application	General View Screen	Regarded as general view screen. The element created by the user can be downloaded to HMI after compile operation and display on HMI screen.
	Apply Print Screen	1. Regarded as print screen. The printer can print the element created by the user after a compile operation. This option is only available in DOP series HMI which supports printer function. 2. When Apply Print Screen function is selected, the editing range will be scaled to the actual paper size of the printer. The user can only print the elements within the range of the paper size. This option is usually used for print typesetting. The user can find a printer setting by clicking **Option** > **Configuration** > **Print** shown as Fig. 2.7.15 below.

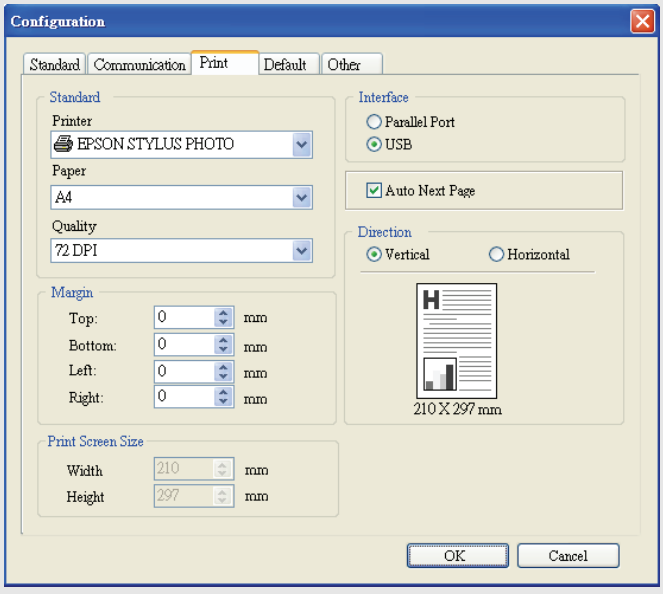
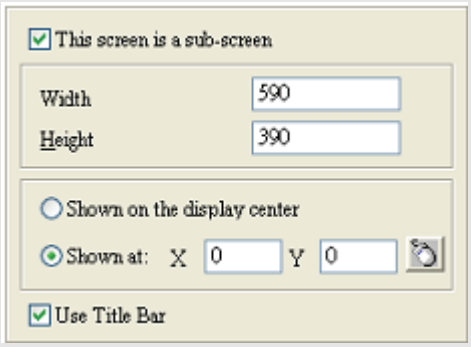
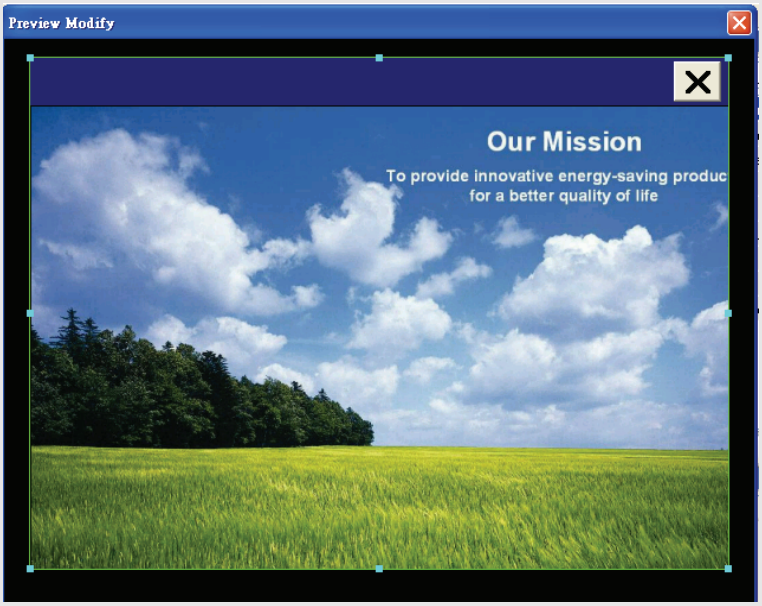


Fig. 2.7.15 Print tab in Configuration option

Function		Description
Sub-screen Setting	Check the check box next to “This screen is a sub-screen”	The check box next to “This screen is a sub-screen” can be checked only when General View Screen option is selected. Therefore, before setting sub-screen function, please ensure General View Screen option is selected.  Fig. 2.7.16 Sub-screen setting
	Width	It is used to set the width of sub-screen and the unit is Pixel.
	Height	It is used to set the height of sub-screen and the unit is Pixel.
	Sub-screen Position	The user can decide if the sub-screen is shown on the center position of HMI display or specify the display position freely. Only input the coordinate value directly (X and Y axis) or press the mouse button  to drag the sub-screen to the position the user decided (Fig. 2.7.17).  Fig. 2.7.17 Sub-screen position
	Title Bar	When the check box next to “Use Title Bar” is checked, the title bar will be shown when opening sub-screen.
Cycle Macro Delay Time		It is used to set Cycle Macro Delay Time when this screen is executed every time. The range of the cycle macro delay time is within 100ms ~ 5s.
Fast Refresh Rate		There are three levels of the Fast Refresh Rate and they are High, Medium and Low. The purpose of this function is used to make some elements be displayed immediately when switching screens. Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, it only allows four elements that can be renewed immediately in each screen. If the user uses this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary.

Function		Description
Hard Copy Region	Setting	The user can find this function only in DOP series HMI which supports printer function. If the user wants to enable this function, setting the printer in advance is necessary. Please go to **Option** > **Configuration** > **Print** (Fig. 2.7.15) and select the printer first. When this function is enabled, if one report list button is created and its assigned output device is a printer, once the user presses the report list button, HMI will refer to the setting in Hard Copy Region option and execute the screen-printing.
	Top-Left	It is used to set the region of HMI printing area (also called Hard Copy Region) and the unit is Pixel.
	Right-Bottom	
Base Screen	Check the check box next to “Need a base screen”	Every screen can specify any one of the editing screens as a base screen. When the check box next to “Need a base screen” is checked, the base screen will be moved to the back (behind all other elements) as a ground picture. After compile operation is completed and the screen data is downloaded to HMI, HMI will execute all of the elements on the base screen correctly.

2.8 Menu Bar and Toolbar (Tools)

■ Tools

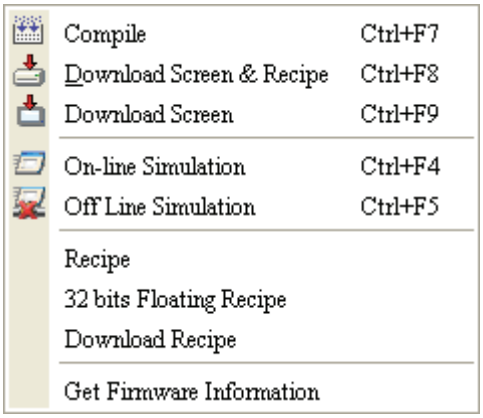


Fig. 2.8.1 Tool options

■ Compile



It is used to compile editing screen to the format for HMI. During compiling, all of the compiling messages, including any errors, will be written to output field. When there is any error occurs, system will remind the user. If there was no error during compiling process, an object file would be produced.

The user can execute this function by clicking **Tools > Compile** or clicking icon directly or using keyboard shortcuts by pressing **Ctrl + F7**. If this project is a new project, it will remind the user of saving before compiling. If this project has been saved or it is an old project, it will compile directly. After compile operation is finished, ScrEdit will save the file again automatically.

Table 2.8.1 Debug Compiling Error

Debug Compiling Error during Compiling Process
1. Create a new project. 2. Create a button element and a numeric entry element on HMI screen and do not change the element default property as the Fig. 2.8.2 below.

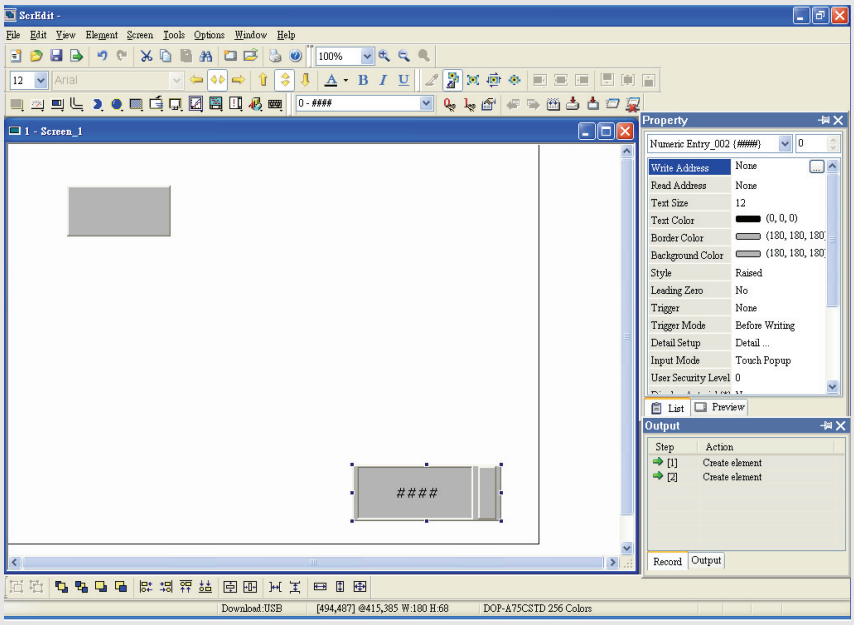


Fig. 2.8.2

Debug Compiling Error during Compiling Process

3. When pressing  icon to execute compile operation, error message dialog box will pop up to warn the user of compiling error and show how many errors there are. In Fig. 2.8.3, we can see that there are two errors occurred and they are all displayed in the output window.

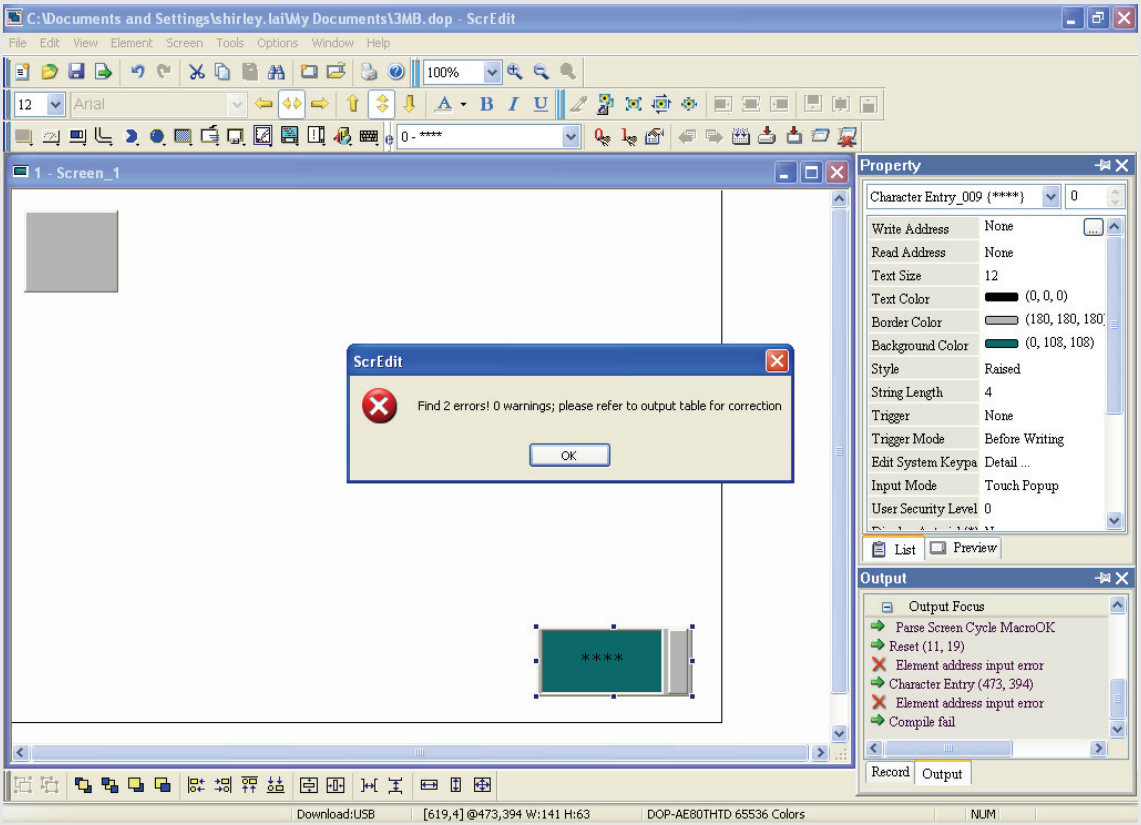
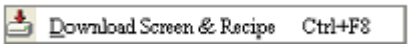


Fig. 2.8.3 Compiling errors during compiling process

4. Once error occurs, the correspondent message will display in output window. The user can click the error message and ScrEdit will switch to error element window automatically.

■ Download Screen & Recipe



The user can download screen data and recipe to HMI by clicking **Tools** > **Download Screen & Recipe** or clicking  icon directly or using keyboard shortcuts by pressing **Ctrl + F8** (Fig. 2.8.4).

If PC cannot connect to HMI, the error messages will be displayed and warn the user (Fig. 2.8.5, Fig. 2.8.6, Fig. 2.8.7 and Fig. 2.8.8). The user can set download interface by clicking **Options** > **Configuration** or by clicking **Options** > **Environment**. The download interface can be USB or RS-232.

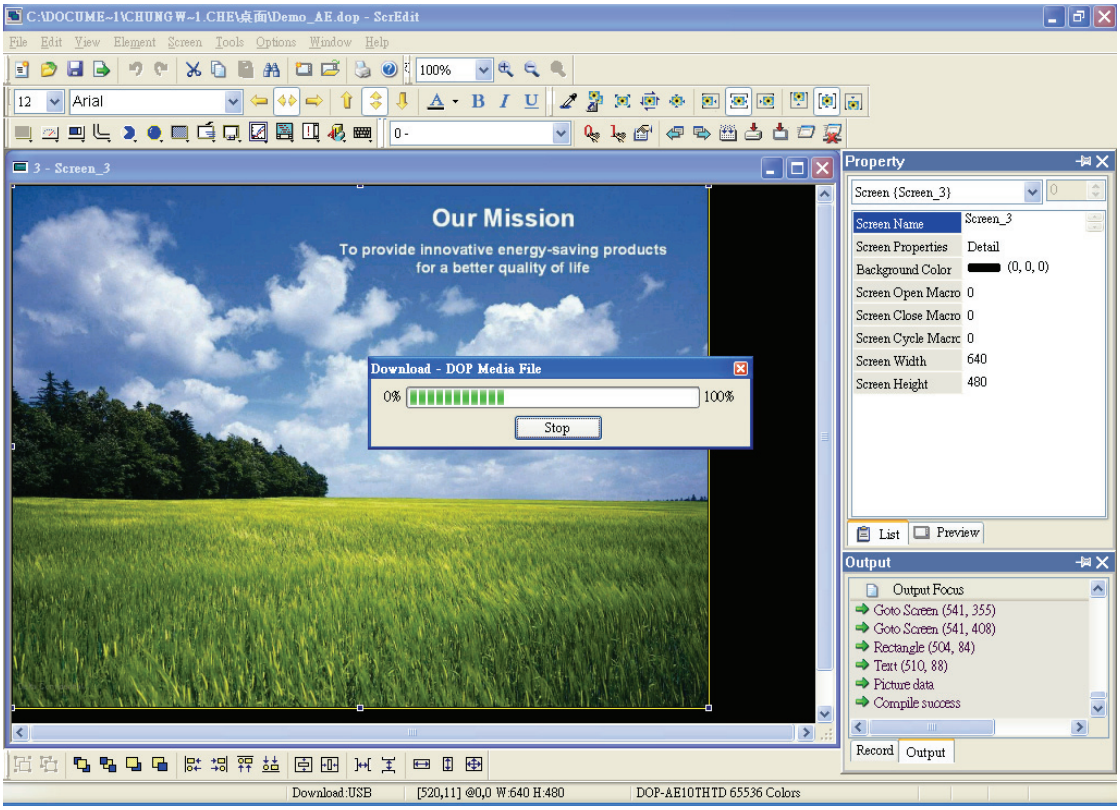


Fig. 2.8.4 Start to download (the progress will be from 0 to 100%)



Fig. 2.8.5 USB open error message



Fig. 2.8.6 USB disconnect error message

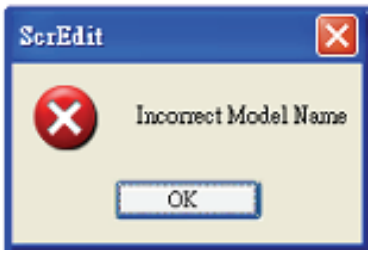


Fig. 2.8.7 Incorrect model name error message

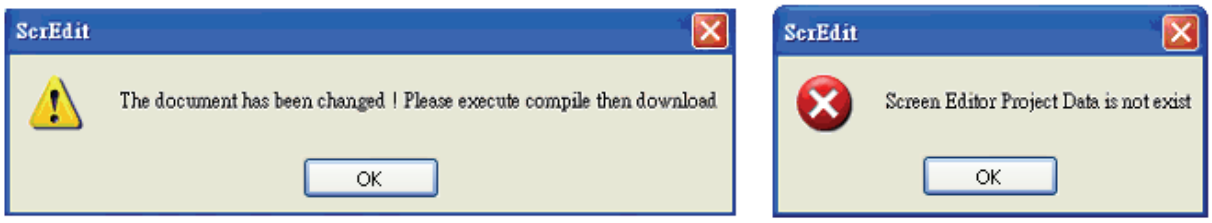
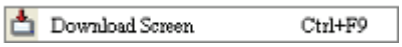


Fig. 2.8.8 Not compile error message

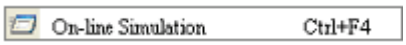
■ Download Screen



It is only used to download screen data to HMI. The user can execute it by clicking **Tools > Download Screen** or clicking icon  directly or using keyboard shortcuts by pressing **Ctrl + F9**.

The download process is the same as the function of Download Screen & Recipe. The only difference is that the function of Download Screen & Recipe allows the user to download the screen data and recipe both but the function of Download Screen allows the user to download screen data only. For the download screen, please refer to Fig. 2.8.4 above.

■ On Line Simulation



It is used to simulate DOP series HMI by computer but HMI should also connect to PLC first to drive PLC by PC simulation through PC communication port. Therefore, the user cannot execute the function of On Line Simulation without connecting PLC. But the user can execute the function of Off Line Simulation without connecting PLC. On Line Simulation function can execute by clicking **Tools > On Line Simulation** or clicking icon  directly or using keyboard shortcuts by pressing **Ctrl + F4**.

Before executing On Line Simulation, system will ask the user to set the communication port for connecting to PLC first (Fig. 2.8.9). For On Line Simulation Screen, the user can refer to Fig. 2.8.10.

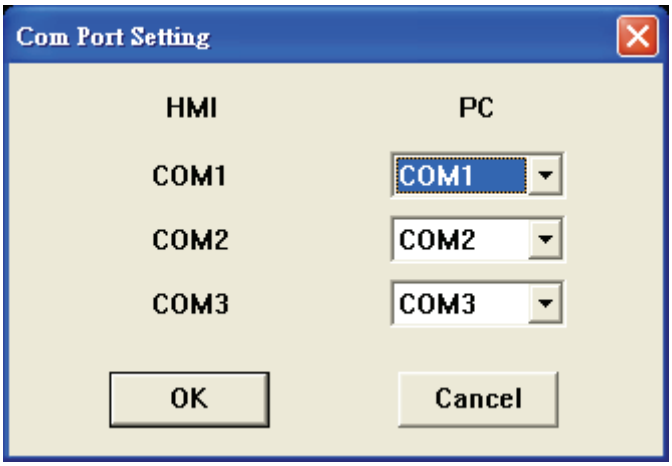
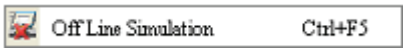


Fig. 2.8.9 COM Port Setting



Fig. 2.8.10 On Line / Off Line Simulation Screen

■ Off Line Simulation



It is used to test if the editing screen, read/write addresses and Macro on is correct on developed program without connecting to PLC. The user can execute this function by clicking **Tools > Off Line Simulation** or clicking icon  or using keyboard shortcuts by pressing **Ctrl + F5**.

For Off Line Simulation Screen, the user can refer to Fig. 2.8.10.

■ Recipe



Recipe function provides the controller a convenient parameter input method. The user can transmit the designated parameter to the controller by using HMI recipe after finishing editing recipe. Bread making is an example. When making different bread, baking time control is very important. The user can use Recipe function to meet the different time requirements for making different bread. The purpose of this function is to reduce the loading of the controller and make the register of the controller to be more flexible in use.

Recipe function provides an easy and quick parameter input method for the connected controller. When completing the recipe editing, the user just needs to use the recipe register in control block and the designated corresponding parameters can be transmitted into the internal memory addresses of the controller.

Recipe can be set and modified by Recipe Setup dialog box (Fig. 2.8.11) and can be saved and used independently without project file. Not only 16 bits recipe file (*.rcp), Delta DOP series HMI products also allow the user to save the recipe data as a 32 bits recipe file (*.csv). Then, the user can edit csv file in Microsoft Windows@ Excel environment conveniently. Before using recipe, the user should enable recipe function first by clicking **Tools > Recipe**. After the recipe function is enabled, the **Recipe Setup** dialog box will pop up (Fig. 2.8.11) and then the user can start to edit the recipe. For the setting of Recipe Setup dialog box, please refer to Table 2.8.2 on next page.

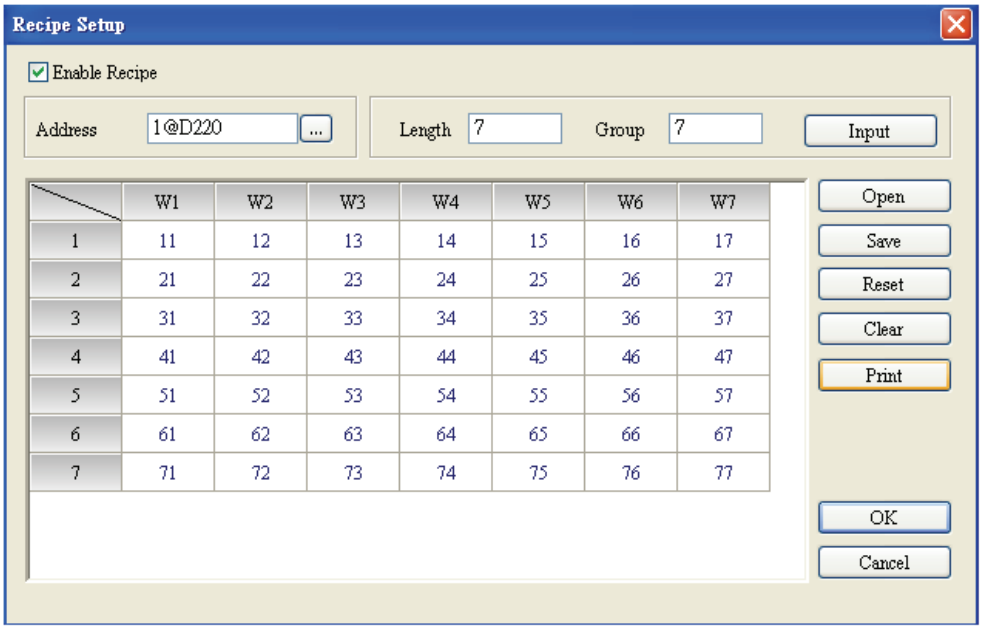
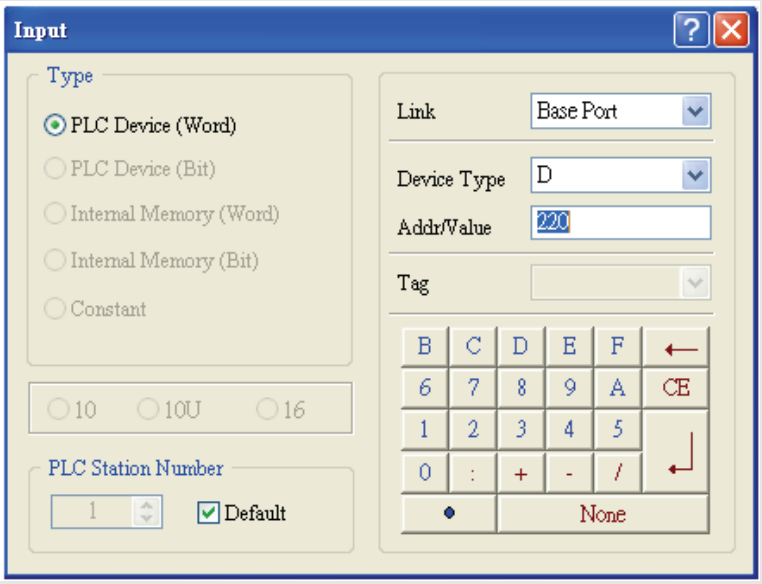
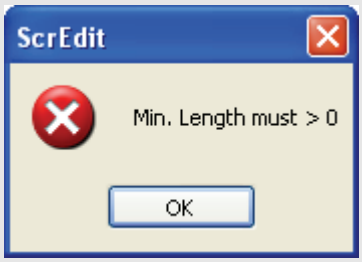
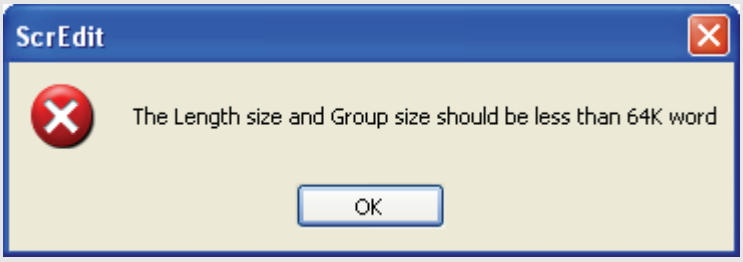
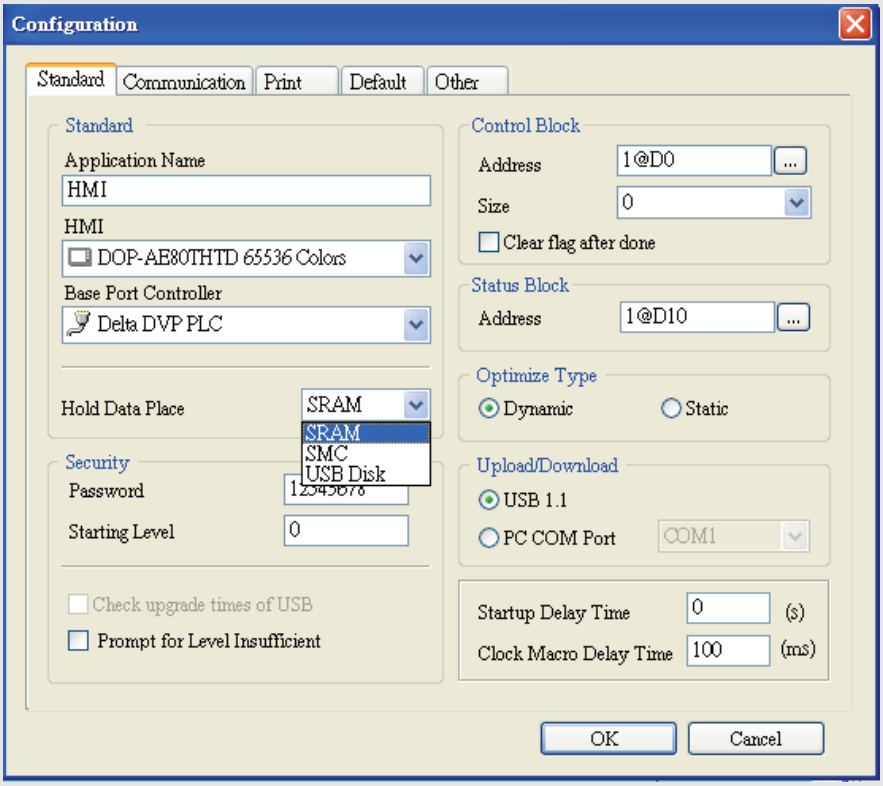


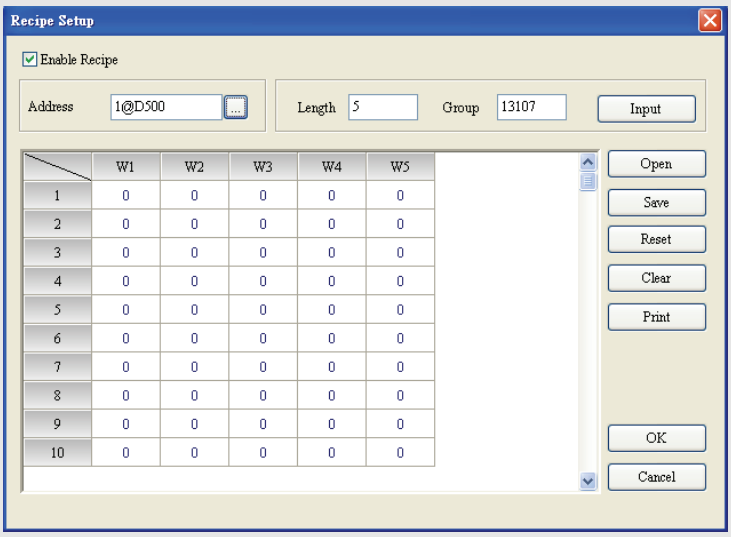
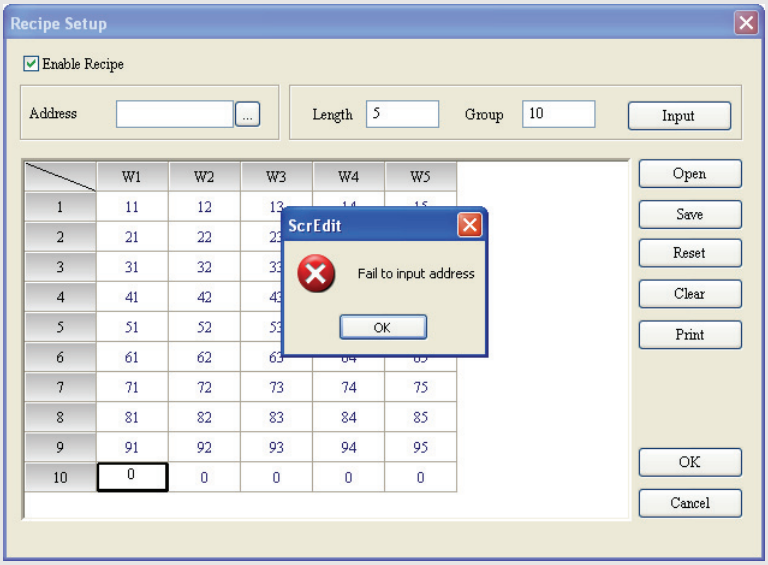
Fig. 2.8.11 Recipe Setup dialog box

Table 2.8.2 Recipe Editing

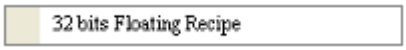
Recipe Setup	
Enable Recipe	When the check box next to “Enable Recipe” is checked, the recipe function is enabled. If the user does not enable this function, the user can not do this function even the user has downloaded recipe data.
Address	The user can input the starting address of recipe data here. It can accept the address in PLC input format and internal memory format. The user also can click ... button to get the address input dialog box (Fig. 2.8.12) to input the starting address.  Fig. 2.8.12 Input starting address dialog box

Recipe Setup	
Length	It is used to set the recipe length. The unit is Word and it should be set to more than 0. Otherwise, the following dialog box shown as Fig. 2.8.13 will display on the screen.  Fig. 2.8.13 Length input error message
Group	It is used to set group number of recipe. It is convenient for the user to use recipe by switching. The group number should be set to more than 0. Otherwise, the following dialog box shown as Fig. 2.8.14 will display on the screen.  Fig. 2.8.14 Group input error message
Input	After setting length and group number of recipe, the user can click  button to edit the recipe data. The memory size for recipe is limited and the memory size for recipe is 64K. It indicates that the total recipe size should be less than 64K (The number of Length x Groups should be less than 65536). If the total recipe size exceeds the limit, the user will see a warning message shown as Fig. 2.8.15 displayed on the screen.  Fig. 2.8.15 Input error message The above-mentioned memory means the non-volatile memory of HMI, i.e. SRAM. Some DOP series HMI, which supports USB host function, allows the user to use more recipe data via this USB host interface. Supporting USB host function means it has a built-in USB host interface. The user can connect HMI to a USB flash drive via this USB host interface and input more recipe data. However, there is still a limit for the input value of recipe length and groups. When Hold Data Place is selected as USB flash drive, the length x groups should be less than 4096K (The number of Length x Groups should be less than 4194304). The user can change the selection of Hold Data Place by clicking **Options > Configuration > Standard**. Please refer to Fig. 2.8.16 on next page.

Recipe Setup	
Input	 Fig. 2.8.16
Open	The user can load recipe data by clicking Open button. The loaded recipe data do not contain the starting address of recipe data. Therefore, regardless of which brand of the controller connecting to HMI, they all can use the same recipe file. There are two recipe file types provided in Delta DOP series HMI, one is 16bits recipe file (*.rcp) and the other is 32 bits recipe file (*.csv) that can be opened in Windows® Excel environment. Please pay close attention to the format of recipe file and make sure that the recipe file is a 16 bits data or a 32 bits data. Do not select the incorrect data format; otherwise the program will not work normally.
Save	It is used to save the editing recipe data to be a file. When saving recipe file, the starting address will not be saved. This lets the user uses the same recipe file in the different brand of the controller. The user also can save the recipe file as 16bits recipe file (*.rcp) and 32 bits recipe file (*.csv) that can be opened in Windows® Excel environment.
Reset	When the user clicks Reset button, all related recipe setting and input recipe data will be deleted. There is no other method to retrieve the recipe except for using Import function to import the saved recipe data again.
Clear	All input recipe will be cleared to 0 (zero) when clear function is selected. Please refer to Fig. 2.8.17 on next page.

Recipe Setup	
Clear	 Fig. 2.8.17
Print	It will print all recipe data on current screen.
OK	After inputting the recipe data, the user can click OK button to save the recipe data for transmitting or modifying. At the same time, ScrEdit will check the validity of all input recipe data. If there is invalid input recipe data value, the OK function will not be executed successfully. For example, in Fig. 2.8.18, ScrEdit found an error and a warning message dialog box display on the screen as the user did not input the starting address of the recipe.  Fig. 2.8.18
Cancel	It will force the system to exit the Recipe Setup dialog box without saving anything after clicking Cancel button. Therefore, please consider carefully before clicking this button.

■ **32 bits Floating Recipe**



32 bits Floating Recipe function provides the user to save 32 bits data. The data format includes Signed Decimal, Unsigned Decimal and Floating (The total of Integral and fractional digits cannot exceed 7 digits). To enable this function, the user can click **Tools > 32 bits Floating Recipe**. For the setting of Recipe Setup dialog box, please refer to Fig. 2.8.19 and Table 2.8.3 on next page.

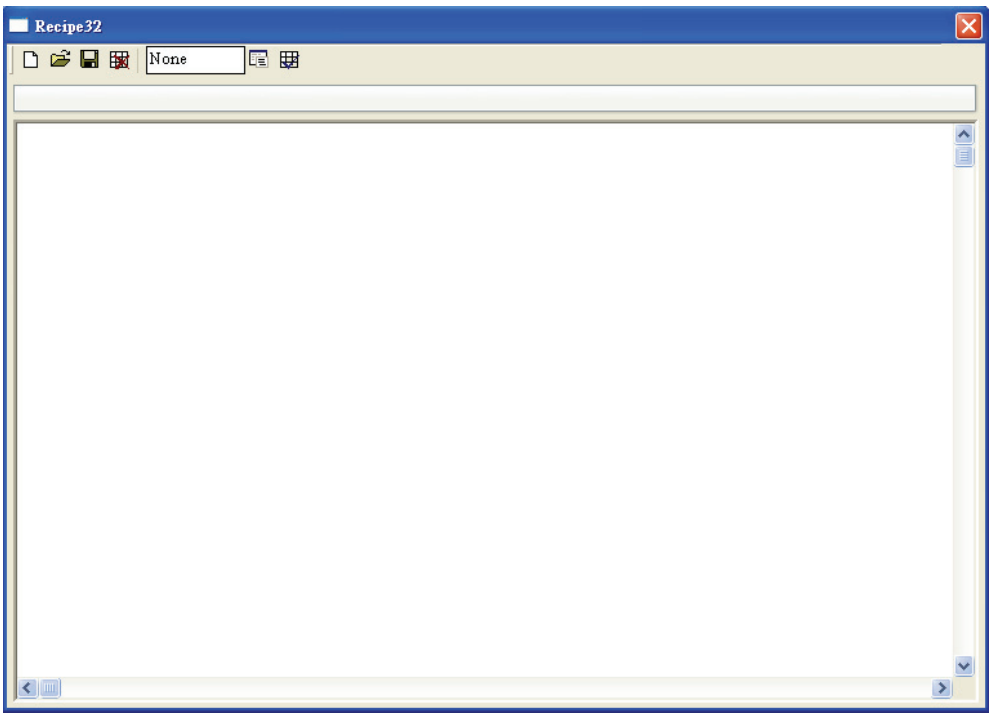


Fig. 2.8.19 32 bits Floating Recipe Setup dialog box

Table 2.8.3 32 bits Floating Recipe Editing

32 bits Floating Recipe Setup	
	New: Create a new 32 bits floating recipe file Press to create a new 32 bits floating recipe. After clicking , a 32 bits floating recipe setup dialog box will display and the user can use it to set the settings of a 32 bits floating recipe. The user can determine the recipe storage address, the length and group number of the recipe, the memory format, and the integer & fractional digit number of the recipe data. There are three kinds of memory format provided, including Unsigned Decimal, Signed Decimal and Floating (Fig. 2.8.20, Fig. 2.8.21 and Fig. 2.8.22). Integer and fractional digit number cannot be selected when the memory format is set to Unsigned Decimal and Signed Decimal. These two options is only available when the memory format is set to Floating. But the total of the Integer and fractional digit number cannot exceed 7 digits. For the number of the 32 bits floating recipe, up to 255 recipes can be set in a 32 bits floating recipe file.

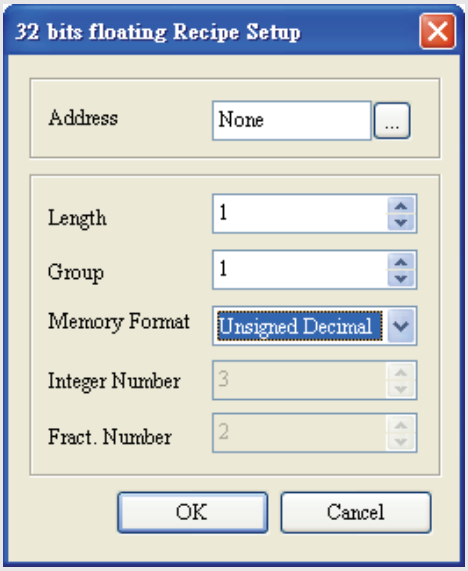


Fig. 2.8.20

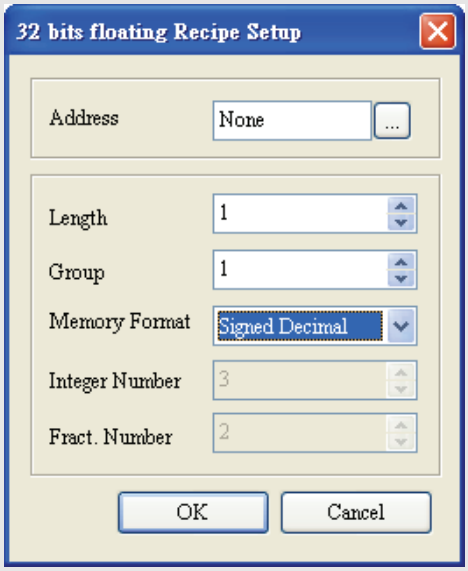
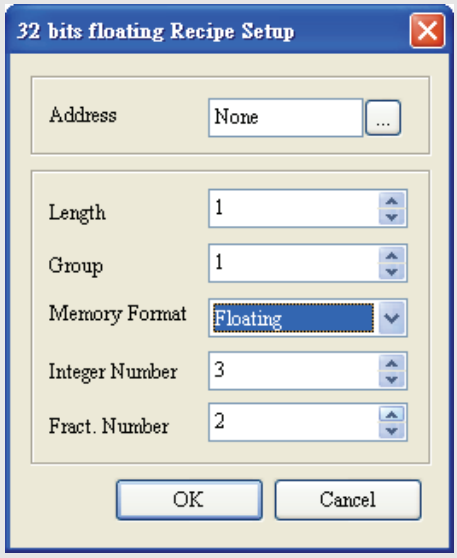
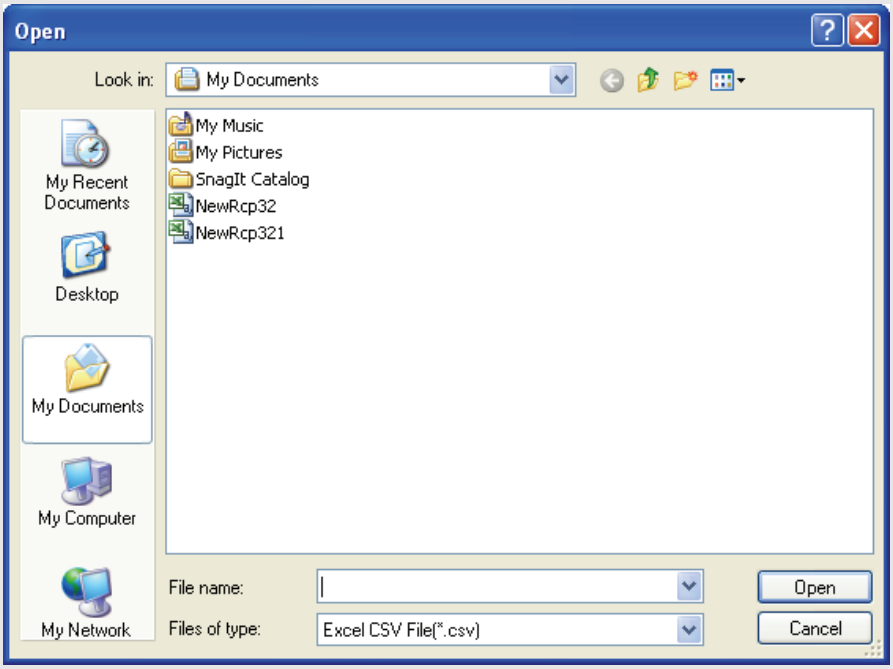
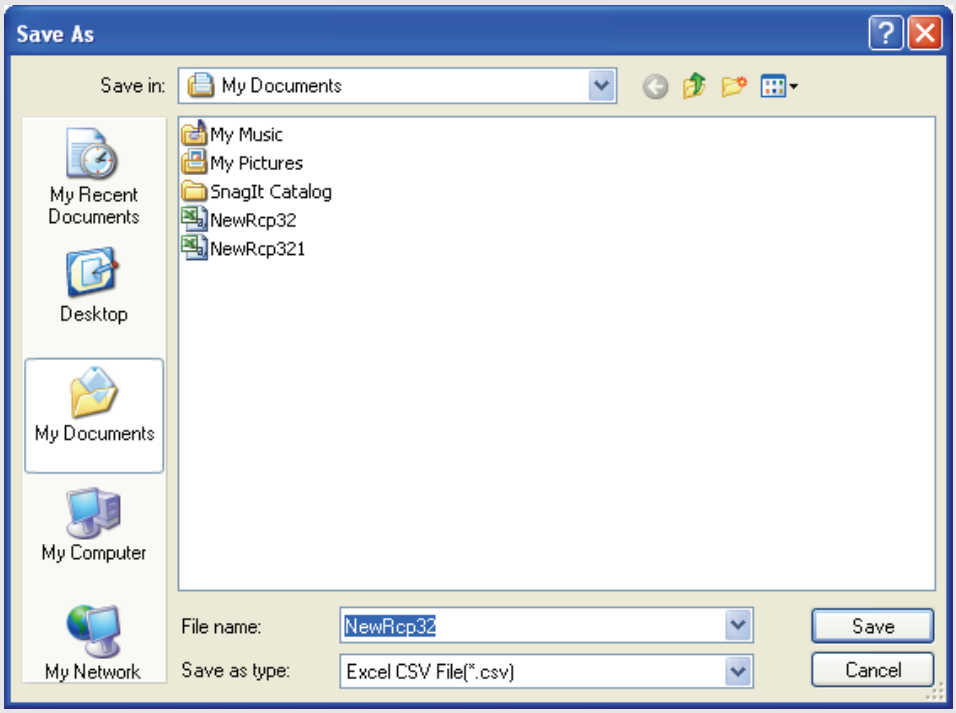


Fig. 2.8.21

32 bits Floating Recipe Setup	
	 Fig. 2.8.22
	Open: Open a 32 bits floating recipe file Press  to open a 32 bits floating recipe file. The file format can be Recipe 32 bits File (*.rcp) and Excel CSV File (*.csv) (Fig. 2.8.23). Please pay close attention to the format of recipe file and make sure that the recipe file is a 16 bits data or a 32 bits data. Do not select the incorrect data format; otherwise the program will not work normally.  Fig. 2.8.23

32 bits Floating Recipe Setup	
	Save: Save a 32 bits floating recipe file Press to save a 32 bits floating recipe file. The default file format of a 32 bits floating recipe file is Excel CSV file (*.csv) (Fig. 2.8.24).  Fig. 2.8.24
	Delete: Delete a 32 bits floating recipe Press to delete unnecessary 32 bits floating recipe.
1@D200	Recipe Storage Address : Display the storage address of a 32 bits floating recipe.
	Setup: 32 bits floating recipe setup When clicking , a 32 bits floating recipe setup dialog box will display and the user can use it to change the settings of a 32 bits floating recipe.
	Enable: Enable 32 bits floating recipe function This function should be selected when the user wants to use 32 bits floating recipe function.

- **Download Recipe**

Download Recipe

Downloads recipe to HMI. It can save time when the user wants to download recipe date only. What the user needs to do is to click **Tools > Download Recipe** and then the recipe data can be downloaded to HMI. The general extension name of recipe file is rcp (Fig. 2.8.25).

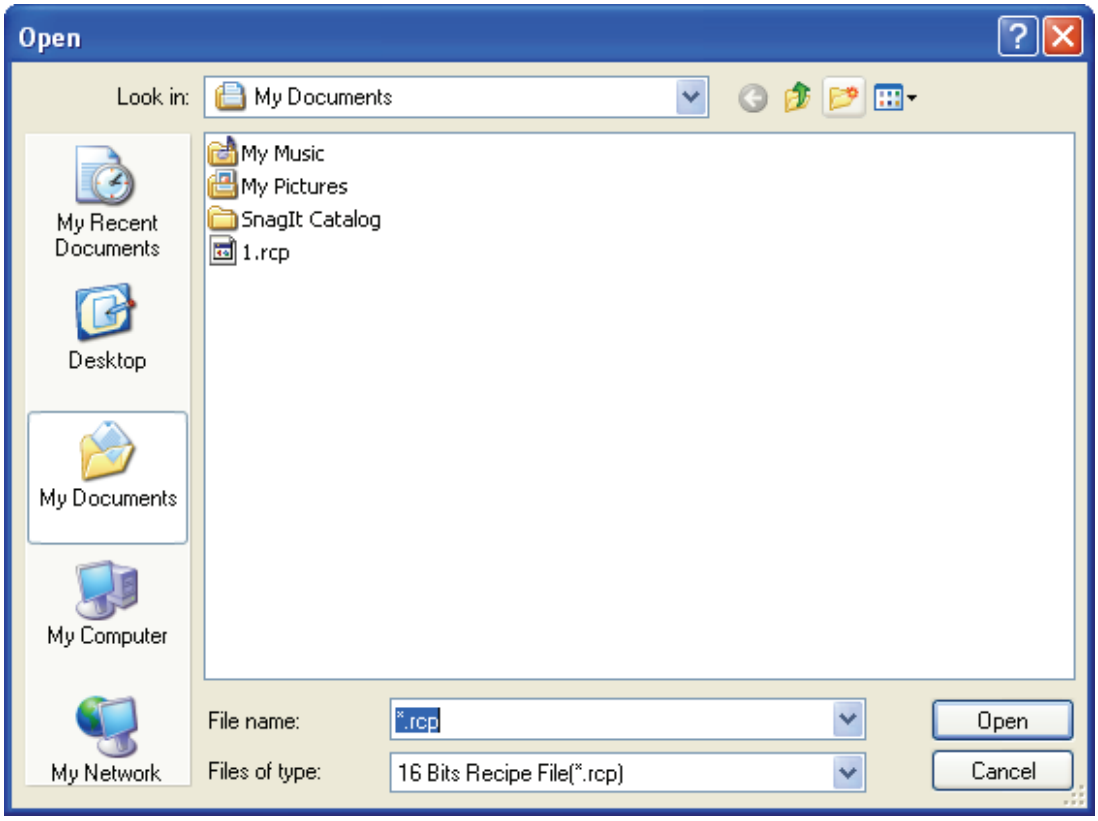


Fig. 2.8.25 Download Recipe

Recipe Example

For recipe control, the user needs to use **Recipe Control Register (RECR)** and **Designated Recipe Group Number Register (RBIR)** to control the read and write operation of recipe. The following section only describes part of the introduction of recipe function. Please refer to Chapter 5 of Delta HMI user manual for more detailed description of the control block.

This recipe example can be downloaded via the following link:
http://59.120.64.39:81/phpbb2/files/recipe_202.dop

The function and explanation of each WORD (register) of control block are listed below.

Word Number	Register Number	Example
0	Register for designating Screen Number (SNIR)	Dn (D0)
1	Control Flag Register (CFR)	Dn+1 (D1)
2	Curve Control Register (CUCR)	Dn+2 (D2)
3	Register for Sampling History Buffer (HBSR)	Dn+3 (D3)
4	Register for Clearing History Buffer (HBCR)	Dn+4 (D4)
5	Recipe Control Register (RECR)	Dn+5 (D5)
6	Register for designating Recipe Group Number (RBIR)	Dn+6 (D6)
7	System Control Flag Register (SCFR)	Dn+7 (D7)

Recipe Control Register (RECR)

Bit Number	Function
0	Recipe number change
1	Read recipe (PLC → HMI)
2	Write recipe (HMI → PLC)
3	Recipe group number change
4~7	Reserved
8~15	Designate change recipe group number

■ Control Flag for Changing Recipe Number

There are two kinds of methods for changing and calling recipe number. One method is to use HMI internal register, RCPNO directly. RCPNO is the internal system register used for designating recipe number. The other method is to use Recipe Control Register (RECR) (Dn+5). When the user wants to change HMI recipe number, i.e. RCPNO value through control block settings, first, it needs to write recipe number (N) into Designated Recipe Number Register (RBIR) (Dn+6, please refer to the explanation of Register for Designating Recipe Number (RBIR) in Chapter 5) and use this control flag to trigger Bit 0 of Dn+5 to be ON. After setting, RCPNO will be changed to N automatically. This flag needs be set to OFF and then ON if the user wants to trigger again.

■ Control Flag for Reading Recipe

The user can change the recipe value of PLC by triggering this control flag (Bit 1 is set to ON). Before reading a recipe from PLC, the user should designate the recipe number (N) first (Please refer to the section “Control Flag for Changing Recipe Number” in Chapter 5). Then, trigger this control flag to ON (Bit 1 is set to ON). After setting, the recipe will be read from PLC and stored in designating area of HMI. This flag needs be set to OFF and then ON if the user wants to trigger again.

■ Control Flag for Writing Recipe

Before writing a recipe to PLC, the user should designate the recipe number (N) first (Please refer to the section “Control Flag for Changing Recipe Number” in Chapter 5). Then, trigger this control flag to ON (Bit 2 is set to ON). After setting, the recipe will be written to PLC. This flag needs be set to OFF and then ON if the user wants to trigger again.

■ Control Flag for Changing Recipe Group Number

There are two kinds of methods for changing and calling recipe group number. One method is to use HMI internal register, RCPG directly. RCPG is the internal system register used for designating recipe group number. The other method is to use Recipe Control Register (RECR) (Dn+5). When the user wants to change HMI recipe group number through control block settings, first, it needs to write recipe

group number (N) into the high byte of this control block and use this control flag to trigger, Dn+5 (Bit 3 is set to ON). After setting, RCPG will be changed to N automatically. This flag needs be set to OFF and then ON if the user wants to trigger again.

Register for Designating Recipe Number (RBIR)

Word	Function
0	Designate receipt number which the user wants to change

By writing recipe group number (N) into Designated Recipe Number Register (RBIR), RCPNO value can be changed. The user can use the control flag for changing recipe number of Recipe Control Register (RECR) to write recipe group number (N) into Designated Recipe Number Register (RBIR) and change RCPNO value.

The following section will introduce how to use recipe. The example is named as recipe.dop and it is saved in the Example folder under Screen Editor software installation directory.

Please click **Tools** > **Recipe** on menu bar and enter into Recipe Setup dialog box. In this example, the Length is set to 6, Group is set to 7 and Address is set to Internal Memory $220. After complete the above settings, your Screen will look like the Fig. 2.8.26 shown below.

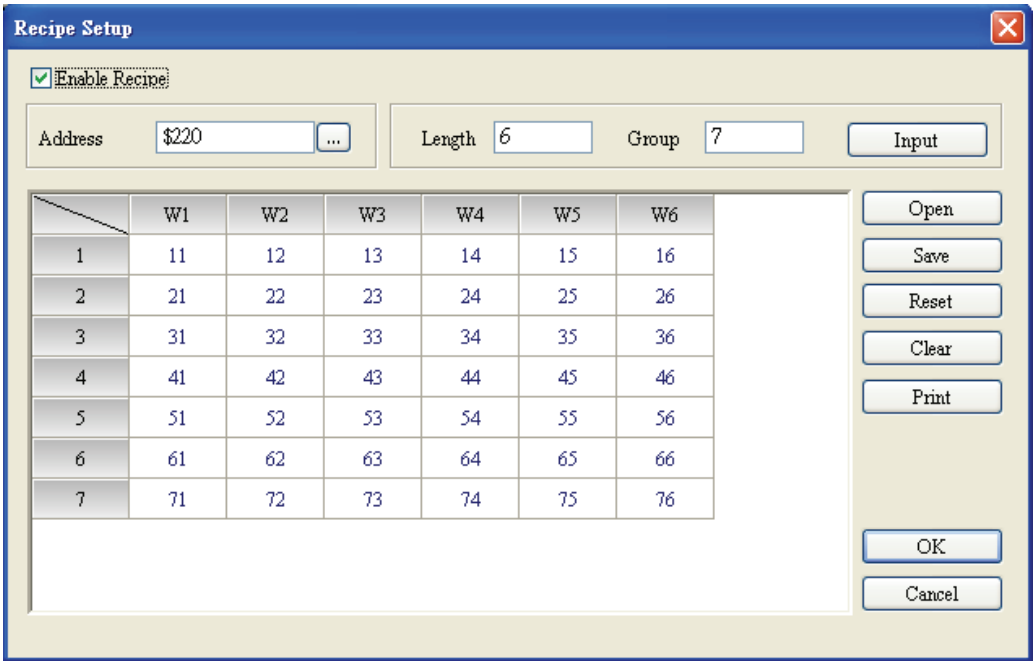


Fig. 2.8.26 Recipe Setup dialog box

Besides, in order to perform simulation operation more conveniently, the Address of Control Block is set to Internal Memory $0. Your Screen will look like the Fig. 2.8.27 shown below.

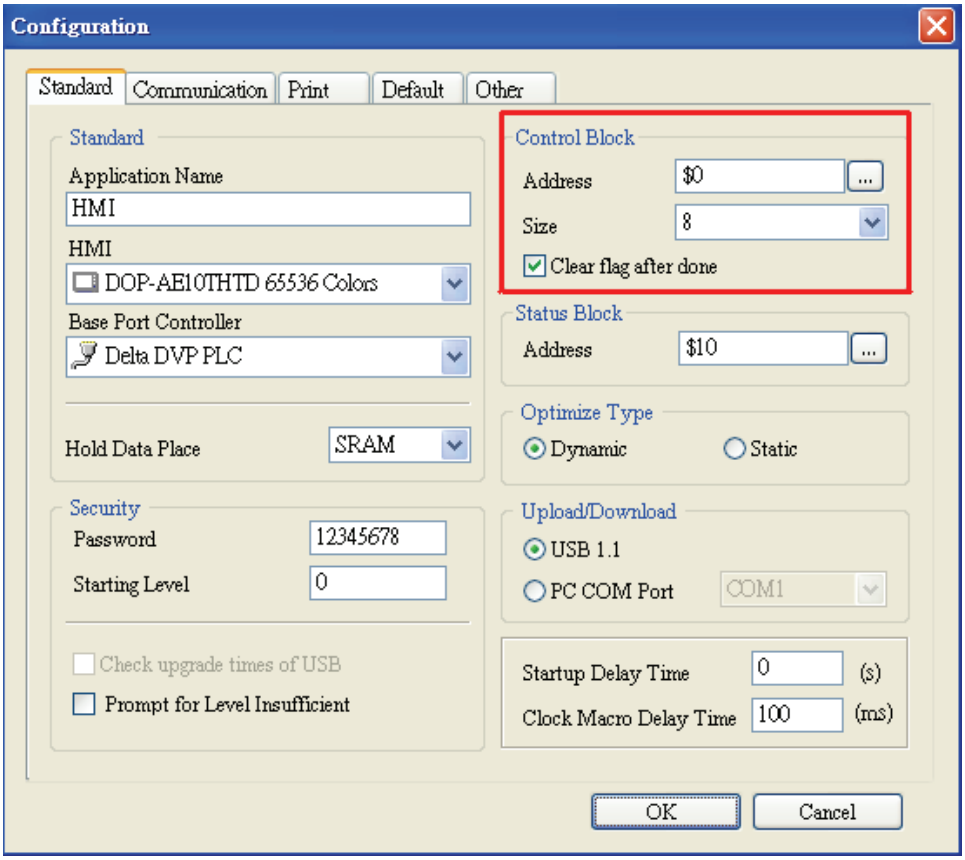


Fig. 2.8.27 Control Block Settings of Configuration dialog box

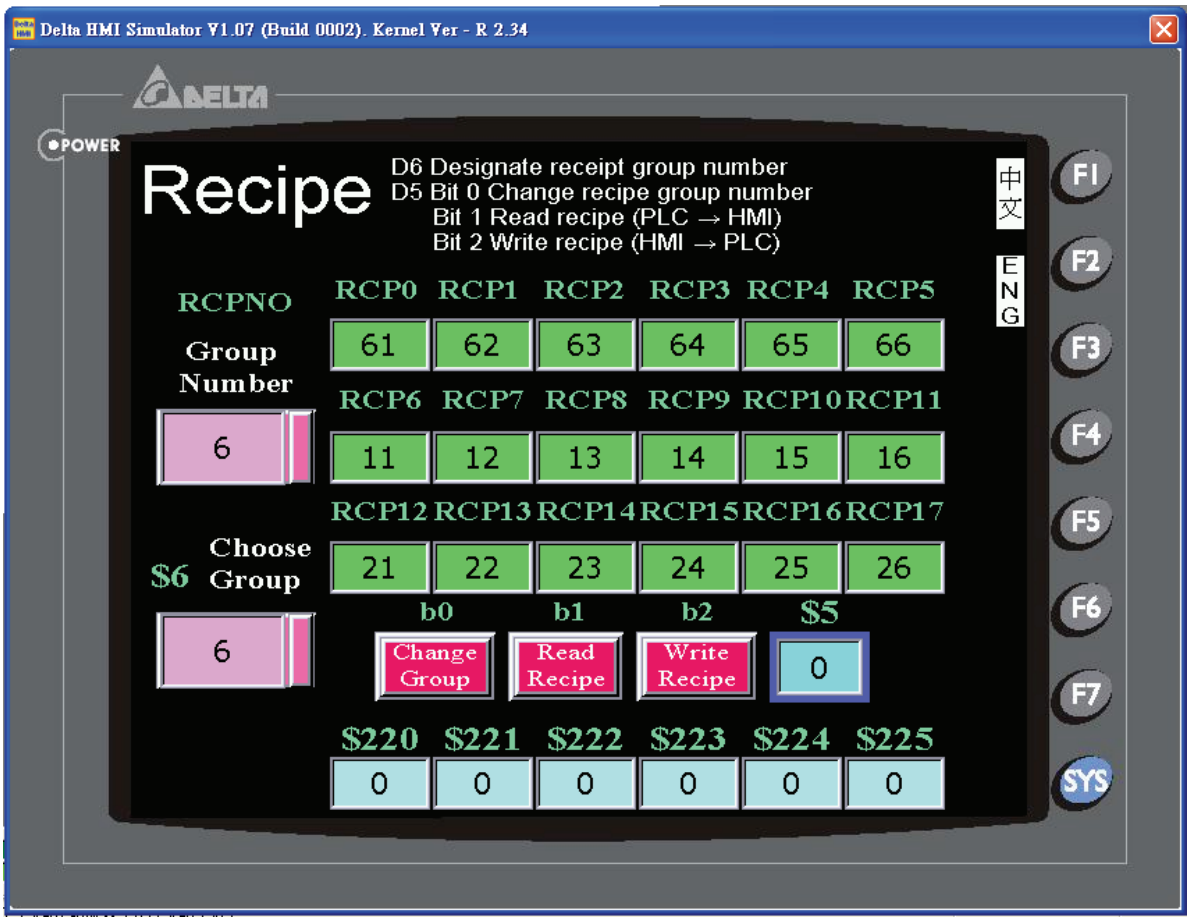


Fig. 2.8.28 Recipe Example

When the user select “Enable Recipe” option in Recipe Setup dialog box, there are RCP and RCPNO two kinds of device types available for the user to select in Input dialog box (See the following Fig. 2.8.29). RCPNO is used to change the recipe group and RCP is used to store the recipe data. The content of recipe register depends on the recipe data set by the user. The recipe changes, the recipe register also changes. In this example, RCP0 ~ RCP17 are recipe registers and HMI will store the recipe data set by the user in these recipe registers. If these registers have the corresponding recipe set by the user, HMI will create recipe data into the internal recipe register automatically and select the value in Input dialog box (See the following Fig. 2.8.29). $220 ~ $225 are the destination addresses that are used to store the recipe data (Generally, the recipe data are set to be stored in the addresses of external controller registers, but for the convenience of simulation operation, we set the recipe storage address in the internal memory). $5 is used to display the status of Recipe Control Register (RECR). Write Recipe ($5.2) button is used to execute write recipe operation. When this button is pressed, HMI will write the recipe data from HMI recipe register RCP into the designated recipe storage address ($220 ~ $225). Read Recipe ($5.1) button is used to execute read recipe operation. When this button is pressed, HMI will read recipe data of recipe storage address ($220 ~ $225) back to HMI recipe register RCP. $6 is RBIR, i.e. Designated Recipe Group Number Register and its function is the same as the function of RCPNO. The difference between these two registers is that RCPNO is a fixed address of HMI internal memory, but the address of RBIR can be changed according to the setting of control block (See 2.8.27 on previous page).

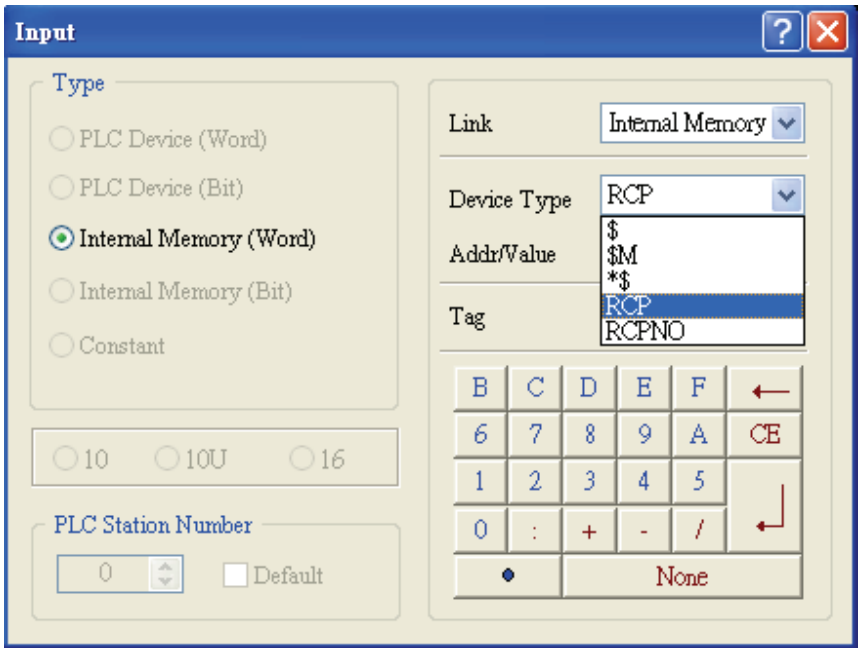


Fig. 2.8.29 Input dialog box

The definition of Delta HMI recipe register RCP is described as follows. In Fig. 2.8.26, the length of example recipe is set to 6 and the group of example recipe is set to 7. However, HMI actually create recipe registers (RCP0 ~ RCP15) which the length is 6 but the group is 8. As the user can see in the Fig. 2.8.30, RCP0 ~ RCP5 is defined as recipe buffer area and RCP6 ~ RCP17 is the actual recipe storage area. The function of recipe buffer area is for the user to put the desired change recipe data no matter execute Write Recipe or Read Recipe operation. When the user want to change recipe data, the user have to use RCPNO or RBIR these two registers. In the example shown in Fig. 2.8.30, when RCPNO is set to 2, it means that the using recipe group is 2nd group. At this time, HMI will move the data of 2nd group and put them in the recipe buffer area (RCP0 ~ RCP5). Besides using internal memory address (RCPG and RCPNO), the user also can enter into Configuration dialog box and change the address value of recipe register directly. Since the example control block address is set to $0, the user should use $6 RBIR, i.e. Designated Recipe Group Number Register to designate recipe group and press Change Group ($5.0) button to designate the desired using recipe group. When Write Recipe ($5.2) button is pressed, Write Recipe operation will be enabled. HMI will write the recipe data from HMI recipe register RCP into the designated recipe storage address ($220 ~ $225). The example in Fig. 2.8.30 just displays the screen when HMI write the recipe data into $220 ~ $225. Read Recipe ($5.1) button is used to execute read recipe operation. When this button is pressed, HMI will read recipe data of recipe storage address ($220 ~ $225) back to HMI recipe register RCP.

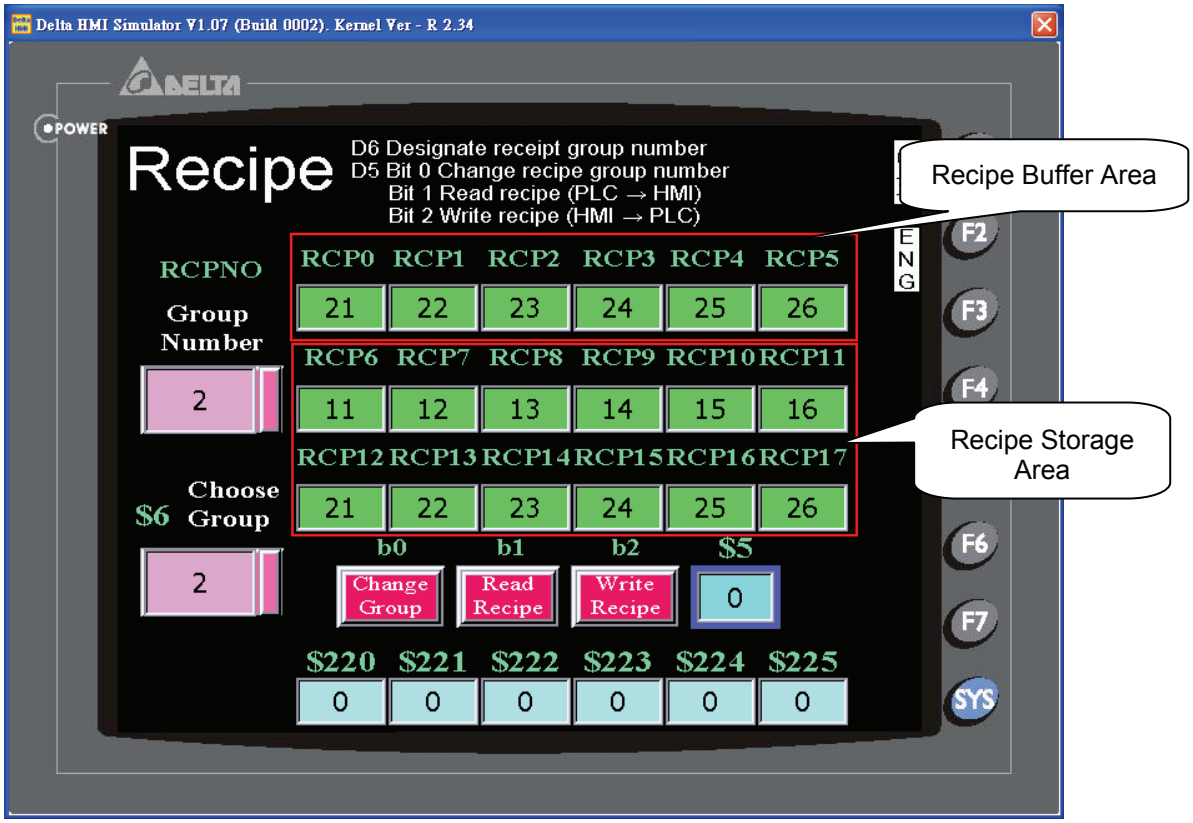


Fig. 2.8.30 Change recipe group

32 bits Recipe Example

This 32 bits recipe example can be downloaded via the following link:

http://59.120.64.39:81/phpbb2/files/32bit_recipe.dop

For the convenience of the user and enhance the flexibility of Delta HMI product on application, not only the existing recipe function, the advanced 32 bits recipe function is also provided. The user can manage the recipe data more flexibly and use this function on high precision controller and industry, e.g. CNC controller, etc.

Besides inputting 32 bits recipe data, the 32 bits floating recipe function also allows the user to save Double Word value. But the best advantage is that it makes recipe editing to be easier and more flexible. The existing recipe function is a two-dimensional matrix. It means the user can set one recipe length and one recipe group to create one recipe data in a project only. It is not user-friendly when the user wants to create one more recipe data in the same project. Therefore, we develop 32 bits floating recipe function and it is designed for the user that needs to input two and more recipe data in a project simultaneously. In other word, the 32 bits recipe function can become a three-dimensional matrix. So, the settings of the 32 bits recipe function will be a little different that the existing recipe function.

For recipe control, the user needs to use **Recipe Control Register (RECR)** and **Designated Recipe Group Number Register (RBIR)** to control the read and write operation of recipe. The user can refer to page 2-74 ~ page 2-79 for the introduction and example of recipe function. For more detailed description of the control block, please refer to for Chapter 5 of Delta HMI user manual

The following section will introduce how to use 32 bits recipe function. The example is named as 32 bits recipe.dop and it is saved in the Example folder under Screen Editor software installation directory.

Please click **Tools** > **32 bits Floating Recipe** on menu bar and enter into 32 bits Recipe Setup dialog box. In this example, you can see that two recipe data is set in different tab. One is B1-4x3 and the other is B2-5x4. B1-4x3 indicates that its Length is set to 4 and its Group is set to 3. B2-5x4 indicates that its Length is set to 5 and its Group is set to 4. The memory format of B1 recipe data is set to Floating and the memory format of B2 recipe data is set to Unsigned Decimal. Please refer to Fig. 2.8.31 below and Fig. 2.8.32 shown on next page.

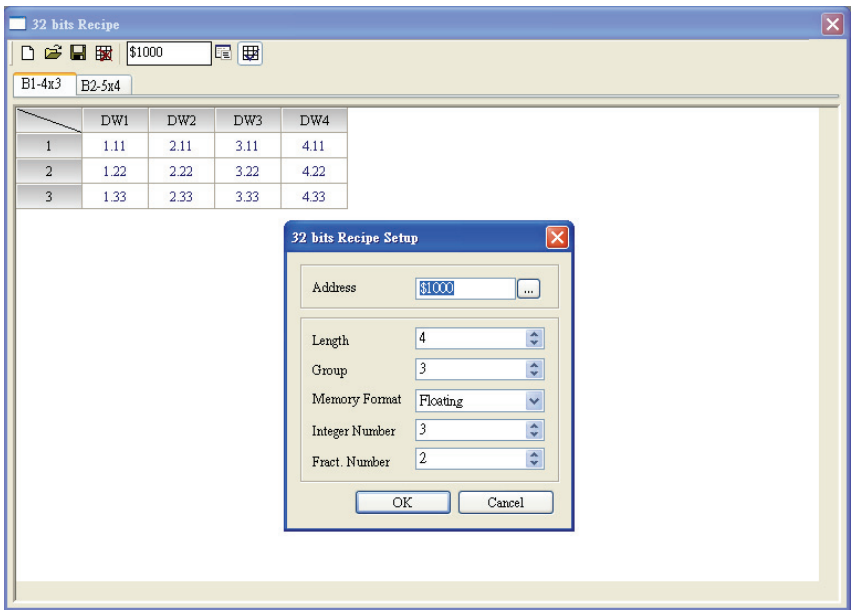


Fig. 2.8.31

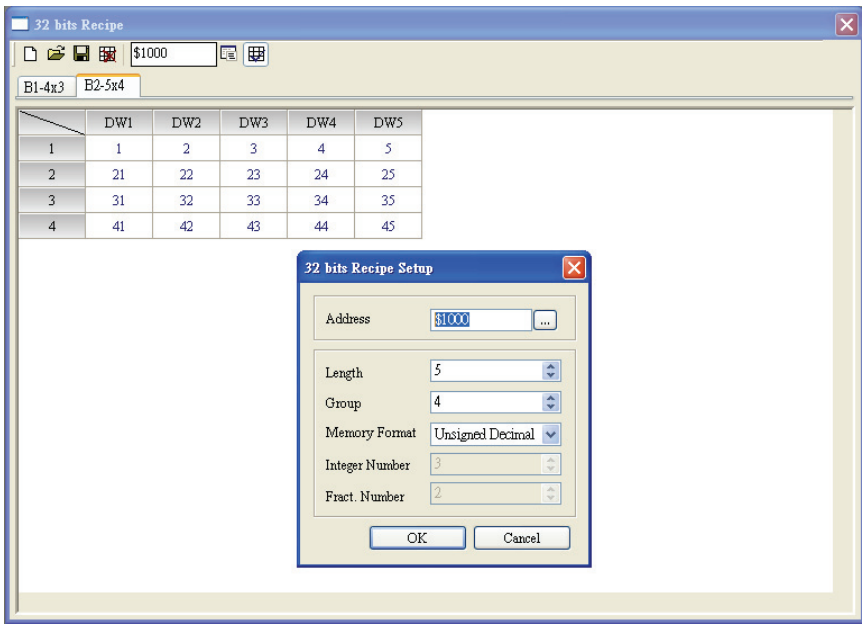


Fig. 2.8.32

In order to perform simulation operation more conveniently, the Address of Control Block is set to Internal Memory $0. Please refer to Fig. 2.8.33 shown below.

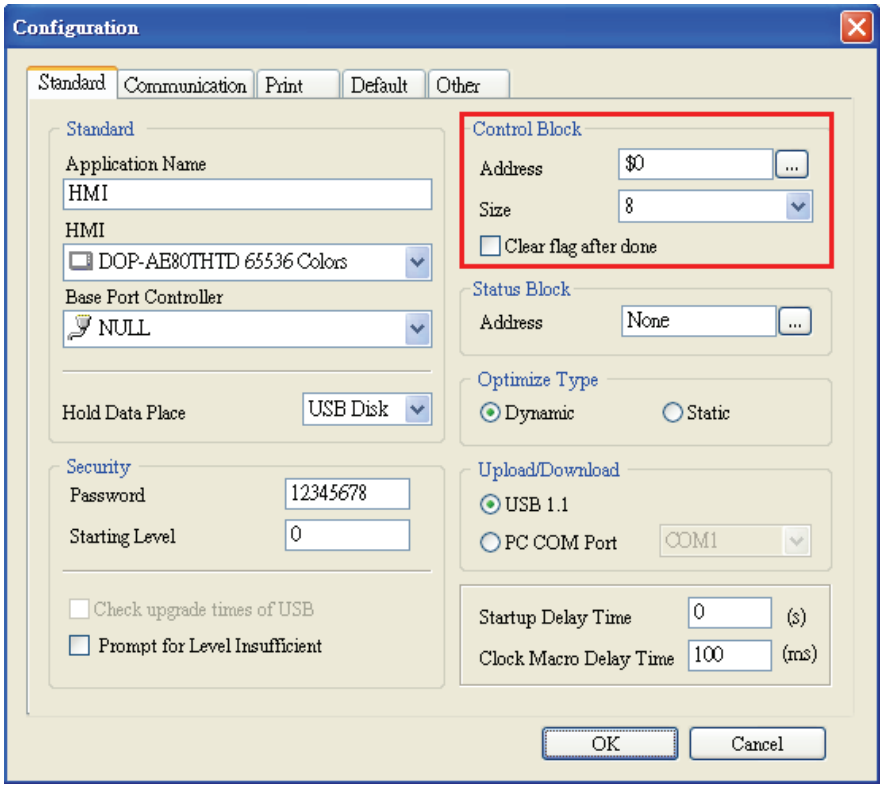


Fig. 2.8.33

Fig. 2.8.34 is an example of starting screen. Besides using internal memory address (RCPG and RCPNO), the user also can enter into Configuration dialog box and change the address value of recipe register directly. No matter what kind of method is chosen, the user still needs to execute recipe read and write operation via Control Block. Pressing Internal Memory button is to switch the recipe data by using internal memory address and pressing Control Block button is to switch the recipe data through the settings of the Control Block.

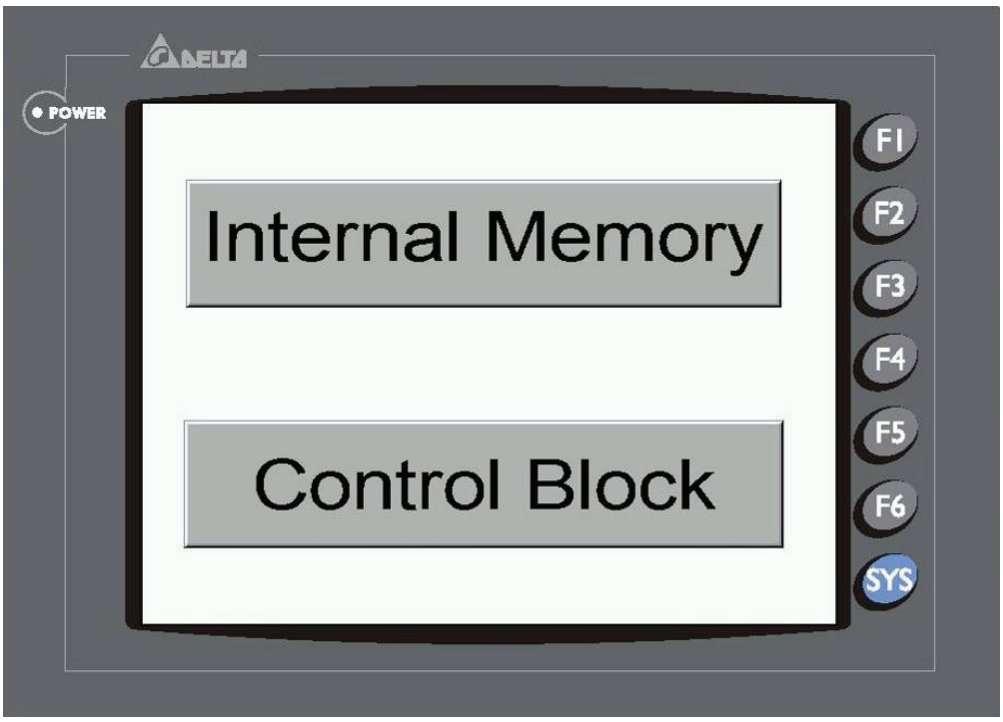


Fig. 2.8.34

When Internal Memory button is pressed, HMI will enter intro the screen shown as Fig. 2.8.35. RCPG is used to store the recipe data, RCPNO is used to change the recipe group and RCP0 ~ RCP15 are recipe registers and HMI will store the recipe data set by the user in these recipe registers. $1000 ~ $1006 are the destination addresses that are used to store the recipe data (Generally, the recipe data are set to be stored in the addresses of external controller registers, but for the convenience of simulation operation, we set the recipe storage address in the internal memory). Because this example uses 32 bits recipe data, each recipe data will occupy two WORD registers. It means that the recipe storage addresses will be $1000, $1002, $1004 and $1006. $5 in green is used to display the status of Recipe Control Register (RECR). Recipe Write ($5.2) button is used to execute recipe write operation. When this button is pressed, HMI will write the recipe data from HMI recipe register RCP into the designated recipe storage address ($1000 ~ $1006). Recipe Read ($5.1) button is used to execute recipe read operation. When this button is pressed, HMI will read recipe data of recipe storage address ($1000 ~ $1006) back to HMI recipe register RCP. Main button is used to return to the screen shown as Fig. 2.8.34.

When the value of RCPG is equal to 0, it means that the display data of RCP register is a 16 bits recipe data. Since there is no 16 bits recipe data set in this example, the value of RCPG will display 0 only and the display of HMI will be shown as Fig. 2.8.35 on next page. When the value of RCPG is equal to 1, it means that the RCP register will display the B1 recipe data (Fig. 2.8.31) and the display of HMI screen will be shown as Fig. 2.8.36 on next page.

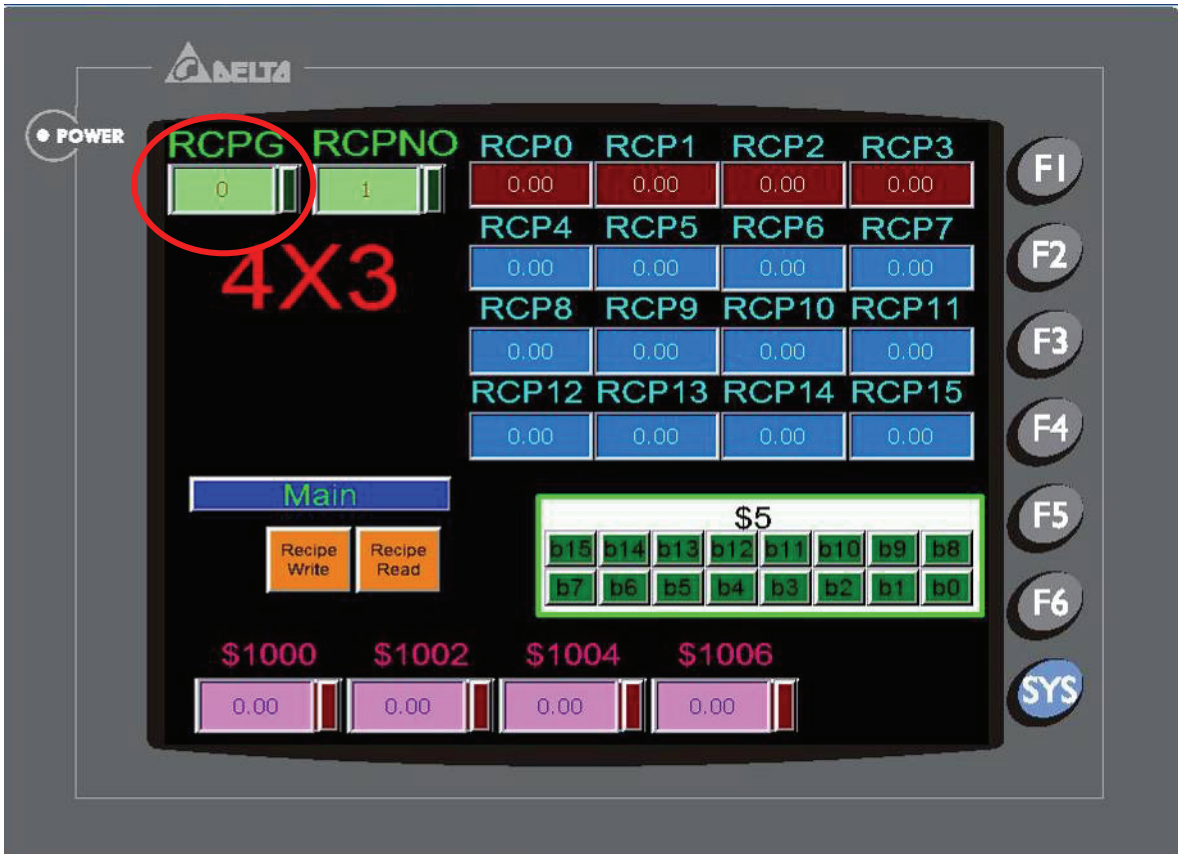


Fig. 2.8.35

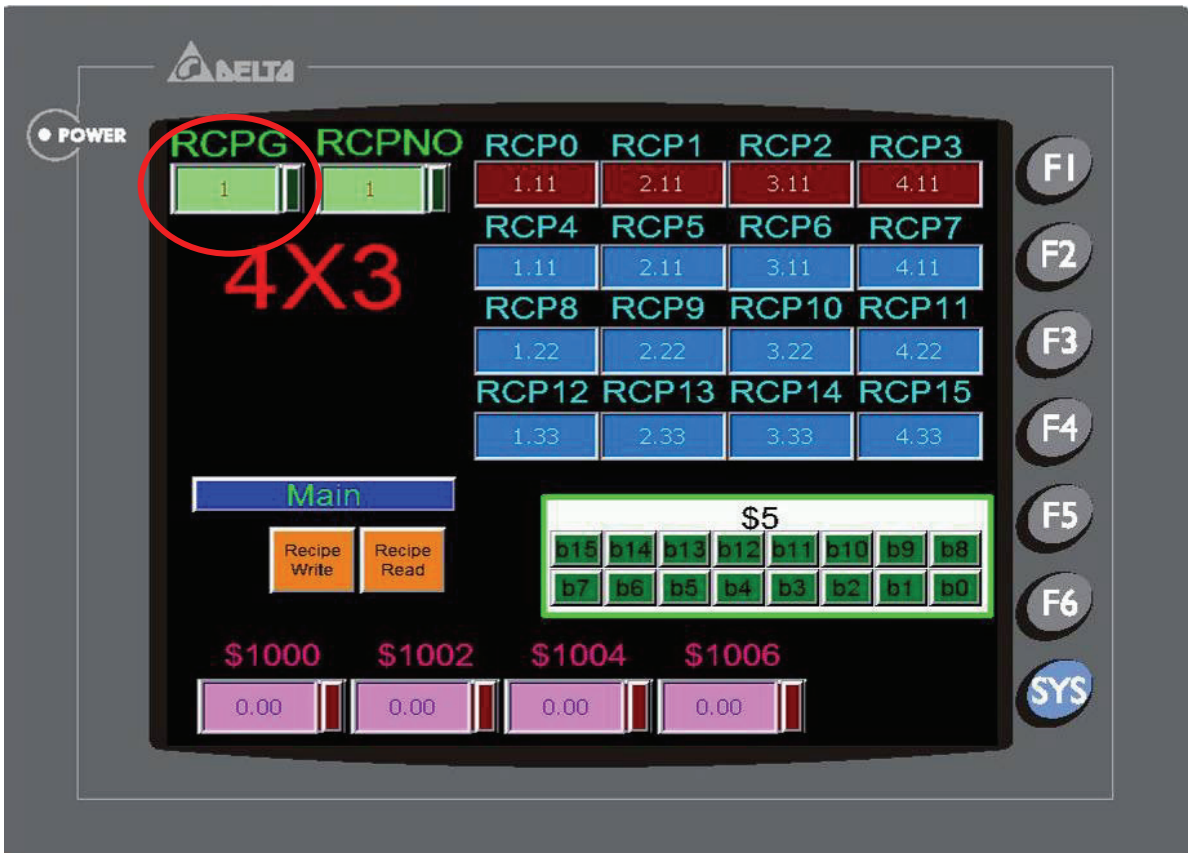


Fig. 2.8.36

The definition of Delta HMI recipe register RCP is described as follows. In Fig. 2.8.31, the length of B1 recipe data is set to 4 and the group of B1 recipe data is set to 3. However, HMI actually create recipe registers (RCP0 ~ RCP15) which the length is 4 but the group is 4. As the user can see in the Fig. 2.8.37 below, RCP0 ~ RCP3 is defined as recipe buffer area and RCP4 ~ RCP15 is the actual recipe storage area. The function of recipe buffer area is for the user to put the desired change recipe data no matter execute Recipe Write or Recipe Read operation. When the user want to change recipe data, the user have to use RCPNO or RBIR these two registers. In the example shown in Fig. 2.8.37 below, when RCPNO is set to 2, it means that the using recipe group is 2nd group of B1 recipe data. At this time, HMI will move the data of 2nd group of B1 recipe data and put them in the recipe buffer area (RCP0 ~ RCP3).

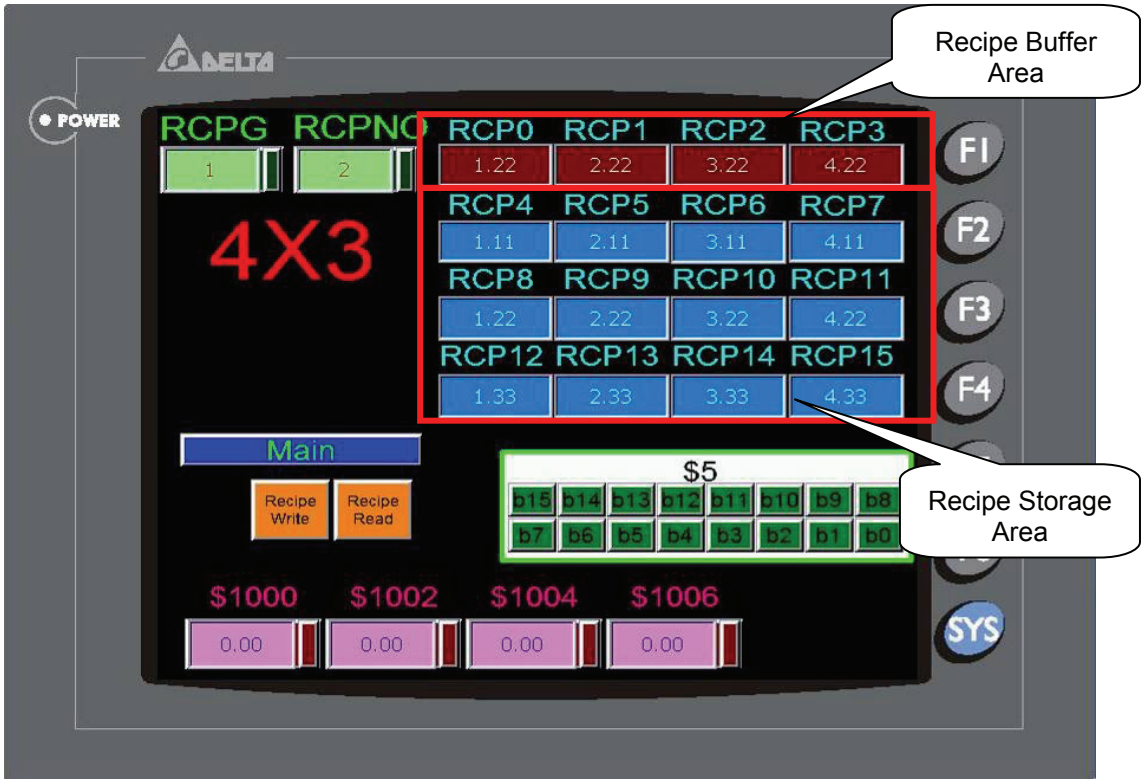


Fig. 2.8.37

As Fig. 2.8.38 shown on next page, when Recipe Write ($5.2) button is pressed, write recipe operation will be enabled. HMI will write the recipe data from HMI recipe register RCP into the designated recipe storage address. The example in Fig. 2.8.38 just displays the screen when HMI write the recipe data into $1000 ~ $1006. Recipe Read ($5.1) button is used to execute recipe read operation. When this button is pressed, HMI will read recipe data of recipe storage address ($1000 ~ $1006) back to HMI recipe register RCP.

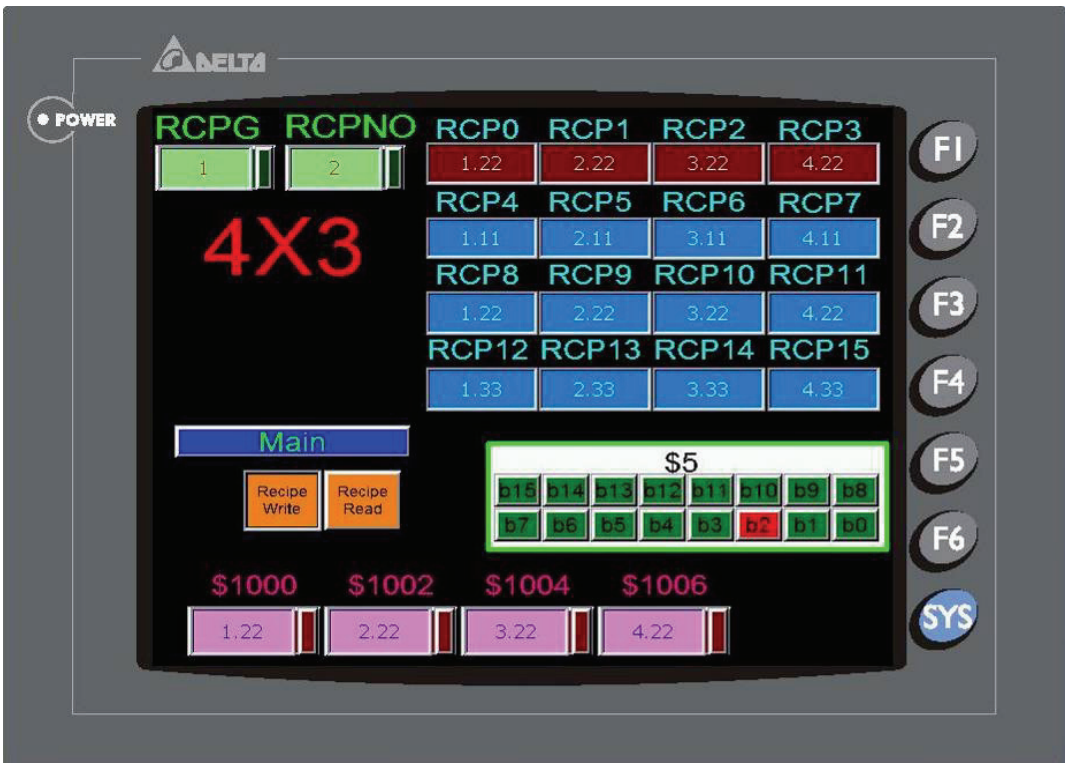


Fig. 2.8.38

Besides using internal memory address (RCPG and RCPNO), the user also can enter into Configuration dialog box and change the address value of recipe register directly. In Fig. 2.8.34, pressing Control Block button is to switch the recipe data through the settings of the Control Block and the example display will be shown as Fig, 2.8.39. In Fig. 2.8.39, $500 is used to set the desired change recipe group number. But there is a After Execute Macro set in this register. The macro explanation is described as follows:

SWAP($501, $500, 1) Exchange the high and low byte of $500 and store the result in $501

$5 = $501 Move the value of $501 to $5

Since the example control block address is set to $0, $5 is set to the Recipe Control Register (RECR) and bit 8 ~bit 15 is defined and used for setting recipe group number. There, the user should set the designated recipe group, exchange the high and low byte and move the value to $5. After recipe group number is set, press Block Change ($5.3) button to change recipe group. After the recipe group is changed, the user should use $6 RBIR, i.e. Designated Recipe Group Number Register to designate recipe group and press Change Group ($5.0) button to designate the desired using recipe group. When Recipe Write ($5.2) button is pressed, recipe write operation will be enabled. HMI will write the recipe data from HMI recipe register RCP into the designated recipe storage address ($1000 ~ $1006). The example in Fig. 2.8.39 just displays the screen when HMI write the recipe data into $1000 ~ $1006. Recipe Read ($5.1) button is used to execute read recipe operation. When this button is pressed, HMI will read recipe data of recipe storage address ($1000 ~ $1006) back to HMI recipe register RCP

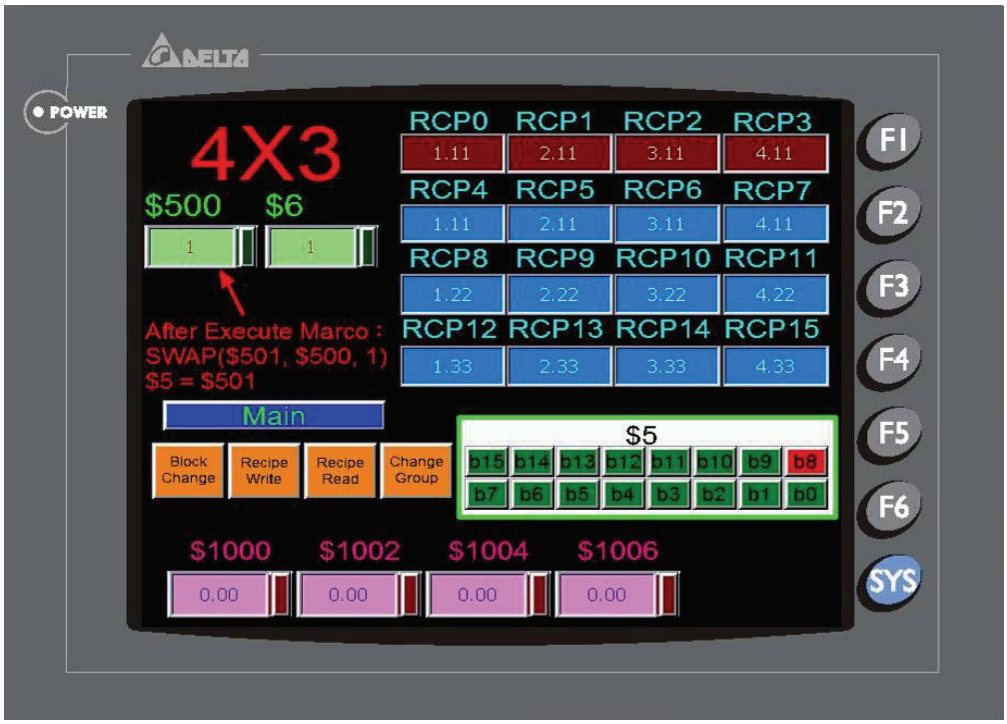


Fig. 2.8.39

Recipe CSV File Editing

There are two recipe file types provided in Delta DOP series HMI, one is 16bits recipe file (*.rcp) that only can be edited in ScrEdit software environment and the other is 32 bits recipe file (*.csv) that can be opened and edited in Windows® Excel environment. The following section will describe how to edit a Excel CSV File (*.csv) in Microsoft Excel. The definition of CSV file of general recipe and 32 bits recipe file are not the same. Both of them will be introduced in the following.

General Recipe Example

The layout of its csv file is shown as Fig. 2.8.40 on next page. The first row shows the length and group number. The other data are the actual recipe value.

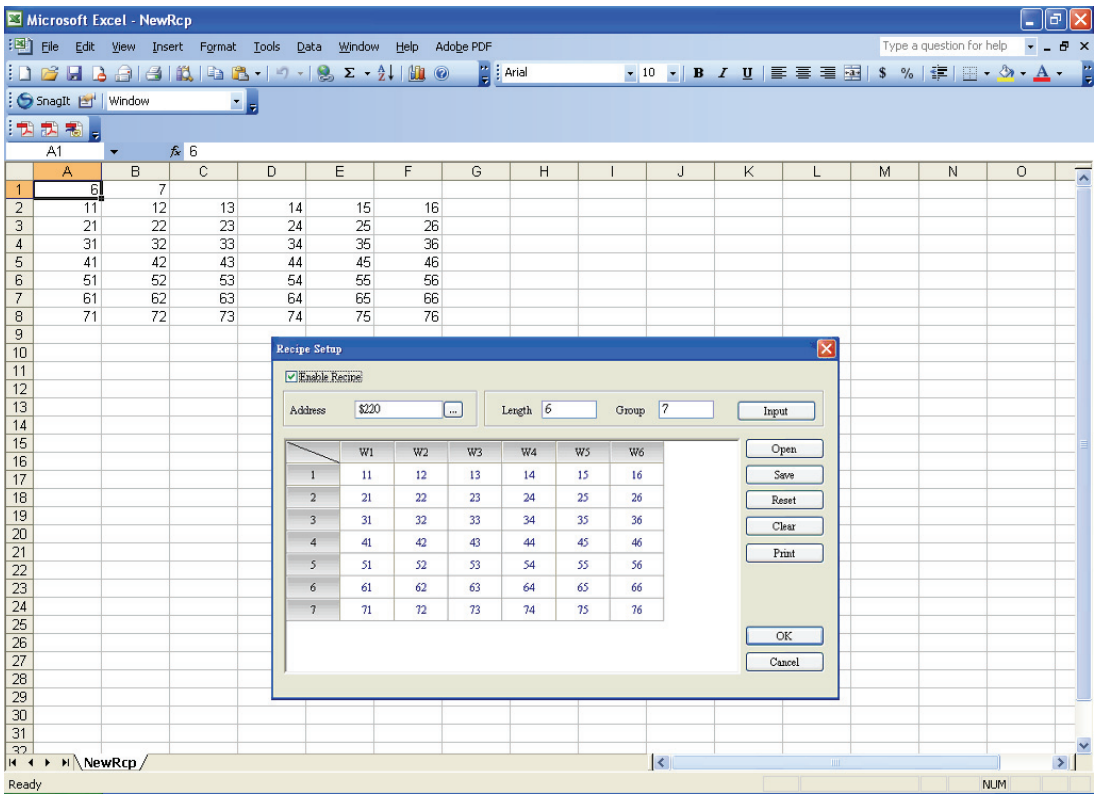


Fig. 2.8.40

32 bits Recipe Example

The layout of its csv file is shown as Fig. 2.8.41 below. The first row shows RCP32-1.0. This is the version of this 32 bits recipe and the user should not change it.

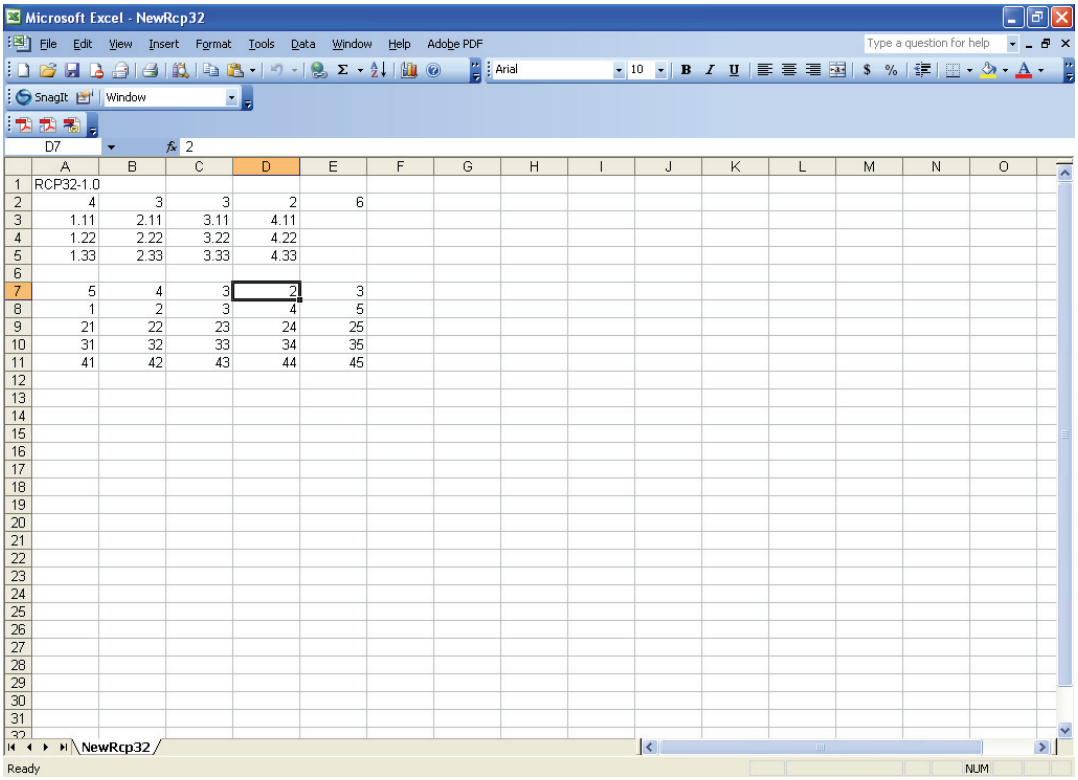


Fig. 2.8.41

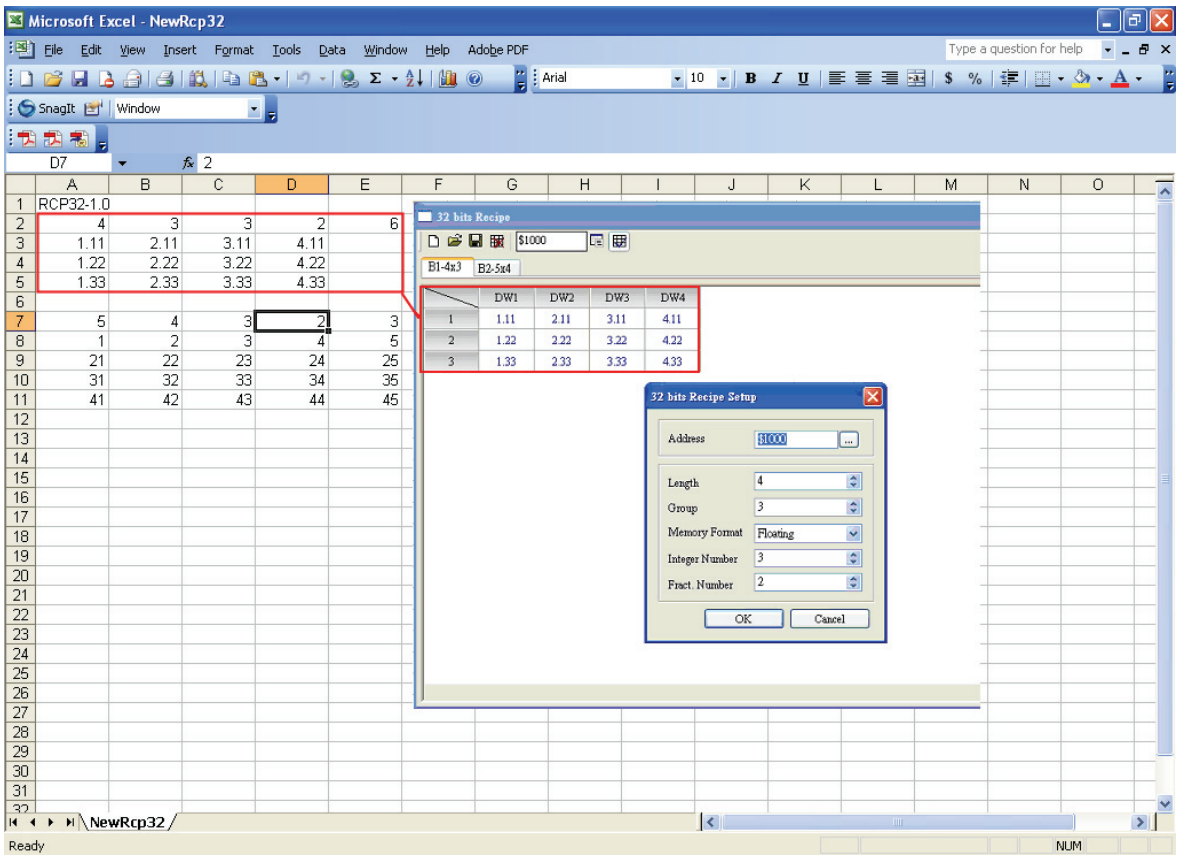


Fig. 2.8.42

Please see Fig. 2.8.42. The right side is the recipe editing window in ScrEdit and the left side is the Excel editing window. You can see the data within the red frame is the first recipe data. The second row of the data listed in Microsoft Excel represents the setting values of the 32 bits recipe.

For the connection between the column in Microsoft Excel and the settings of recipe group data, please refer to the following table.

Column	32 bits Recipe Setup
A	Length
B	Group
C	Integer Number (only can be set when memory format is set to Floating)
D	Fractional Number (only can be set when memory format is set to Floating)
E	Memory Format: 2: Signed Decimal 3: Unsigned Decimal 6: Floating

The data after one empty row is the settings of next 32 bits recipe. The setting method is the same as the first 32 bits recipe.

2.9 Menu Bar and Toolbar (Options)

■ Options

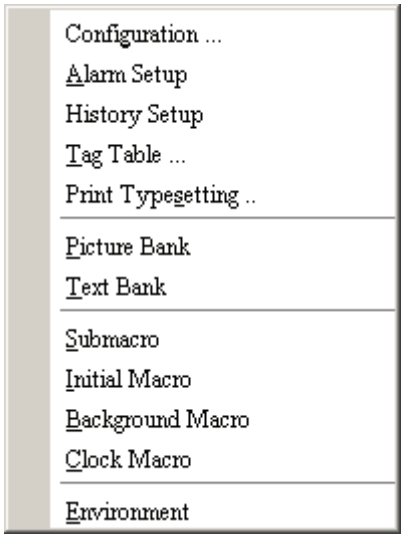
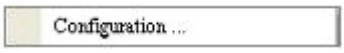


Fig. 2.9.1 Options

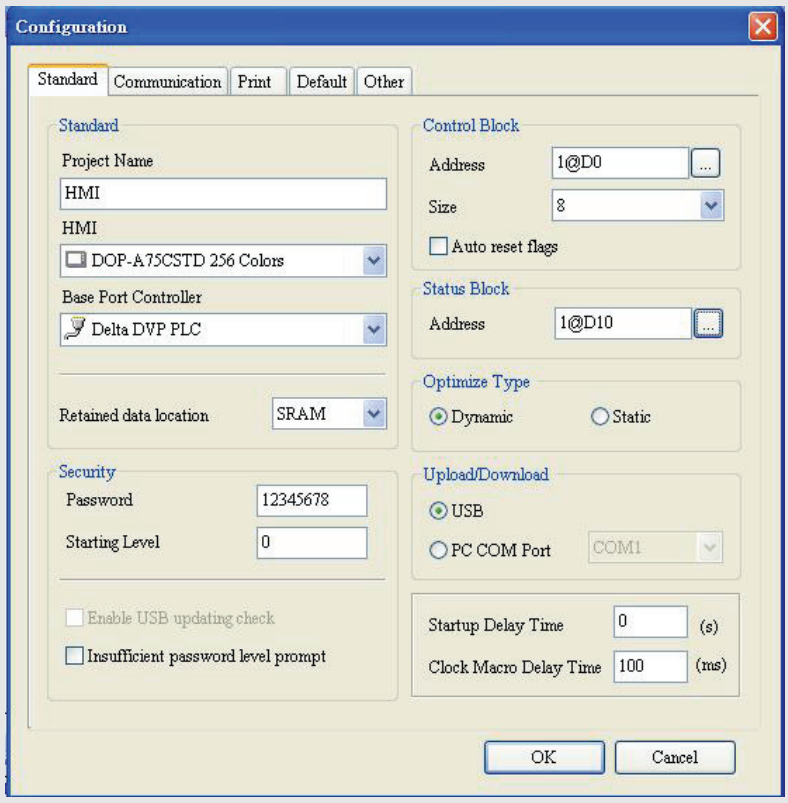
■ Configuration

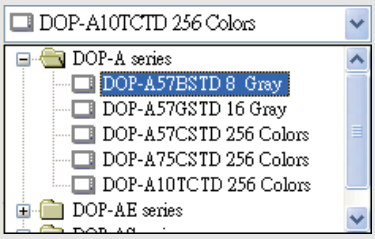
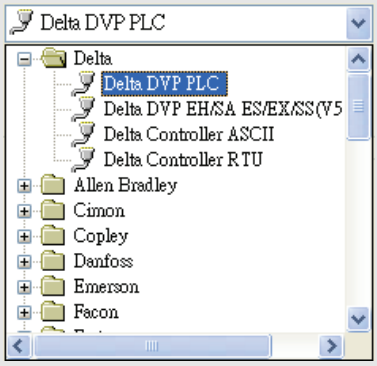


The user can execute this function by clicking **Options** > **Configuration**. This dialog box is divided into five tabs: **Standard**, **Communication**, **Print**, **Default** and **Other**. These tabs are covered in detail in the following sections.

Table 2.9.1 Standard Tab

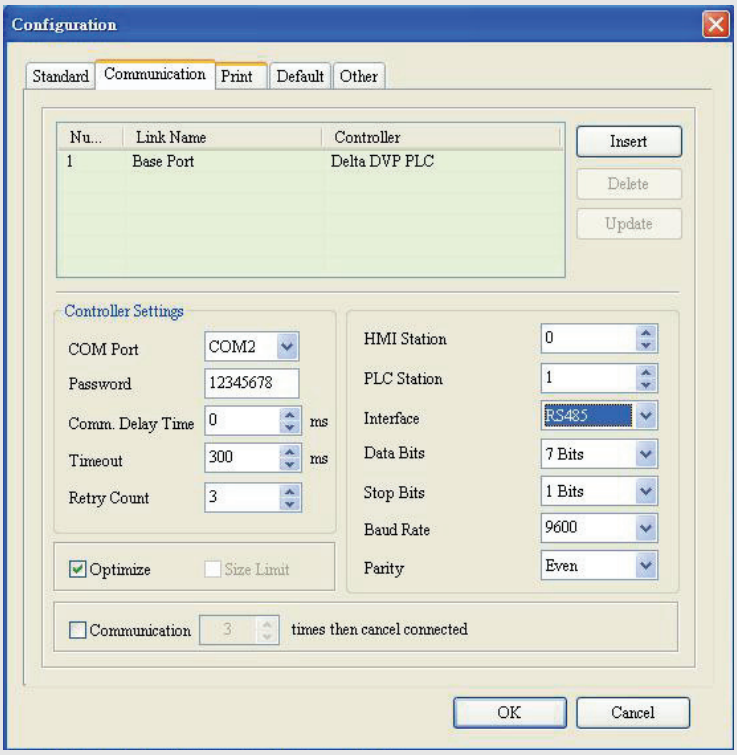
Standard tab in Configuration option

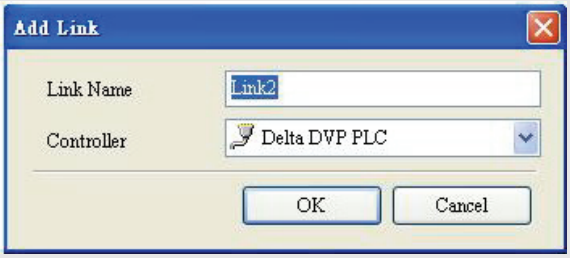


Standard tab in Configuration option	
Application Name (Standard)	It is also File Name.
HMI Type (Standard)	It is used to select DOP series HMI type for different functions and requirements. 
Base Port Controller (Standard)	It is used to set connecting external controller: Screen Editor provides various controllers sorted by manufacturers for the user to select. 
Hold Data Place (Standard)	The backup memory data can be saved in SRAM, SMC and USB flash drive these three places. The user can select one of them from the Hold Data Place drop-down list. However, the backup memory data can only be saved in SRAM and SMC in some HMI types. Therefore, it depends on which HMI the user select.
Password (Security)	It is used to set the highest priority password. There are 8 levels for the password. Meanwhile, this password is also the protection password for the file (project).
Starting Level (Security)	It is used to set start-up priority. The highest level is 7 and the lowest level is 0.
Enable USB updating check	This function is only provided in some DOP series HMI which supports USB Host function. For the detailed introduction, please refer to Appendix C.
Insufficient password level prompt	When this check box is checked, if the priority for the element that is not equal to or higher than the current setting,  will display to remind the user.
Address (Control Block)	It is used to set the starting address of system control block.
Size (Control Block)	The length of control block will be different depending on the function. (For example, the length should be at least 8 Words when using multi-language function). For more detailed information of system control block, please refer to Chapter 5. **Please note that when the control block size is set to 0, the control block function is disabled.**
Auto reset flags	If this check box is checked, the register in the control block will be cleared to 0 when any operation has been finished in the control block.
Address (Status Block)	It is used to set the starting address of system status block. The length is constant 8 words. Each word indicates the different status value of HMI system. For more detailed information of system status block, please refer to Chapter 5.

Standard tab in Configuration option		
Optimize Type	Dynamic	When communicating with the controller, read the address value and optimize the elements that show on the current screen and adjust the read data length according to the number of screen elements. It can save the communication time between HMI and the controller efficiently. We recommend the user to use this function if there is no special requirement. Please note that this Dynamic Optimize function is enabled by the Optimize option in Communication tab. If the Optimize option in Communication tab is not selected, even the user chooses this function in Standard tab, system will not activate the Dynamic Optimize function.
	Static	When communicating with the controller, read the address value and optimize the elements that show on the current screen but will not adjust the read data length according to the number of screen elements. Please note that this Static Optimize function is enabled by the Optimize option in Communication tab. If the Optimize option in Communication tab is not selected, even the user chooses this function in Standard tab, system will not activate the Static Optimize function.
Upload / Download	The user can select USB or PC communication port (i.e. RS-232) to upload and download.	
Startup Delay Time	It is used to set the delay time for the startup of the external controller (i.e. PLC). PLC. The range is 0 ~ 255 seconds.	
Clock Macro Delay	It is used to set interval time when executing clock macro every time. The range is 100 ~ 65535ms.	

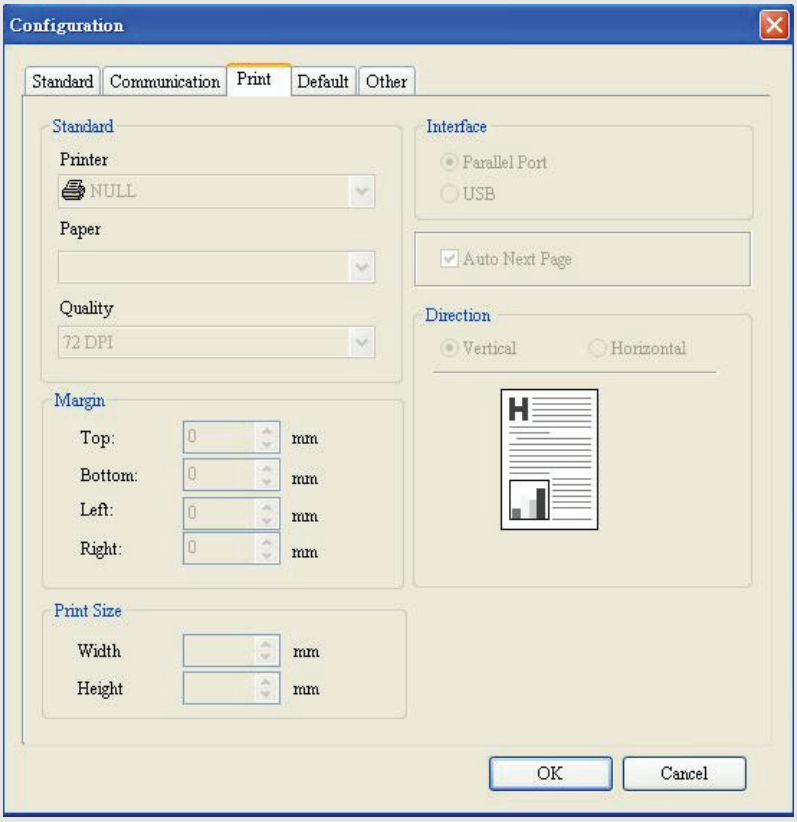
Table 2.9.2 Communication Tab

Communication tab in Configuration option


Communication tab in Configuration option		
Insert / Delete Controller Connection	Insert	Press Insert button to determine the connecting device name and the controller:  It is used to set the connecting controller. Available connecting controller will be different depending on HMI type the user uses. (DOP AE and AS series HMI can support three max. different controllers simultaneously.)
	Delete	It is used to delete the existed connecting controller (One project needs to connect at least one controller).
	Update	Modify the connecting controller or change the controller name.
Controller Settings	COM Port	It is used to set the COM port used to communicate with HMI (COM1 or COM2). COM3 port is only provided in some types of HMI, e.g. DOP AE and AS series.
	Password	Entering a password is necessary for some connecting controllers before communication.
	Comm. Delay Time	It is used to set a delay time for the startup of an external controller (i.e. PLC). The range is within 0 ~ 255 ms.
	Timeout	It is used to set communication time out time when communicating with the external controller. The range is within 100 ~ 65535ms.
	Retry Count	HMI will try to send communication command to the external controller repeatedly if the external controller does not respond during communication. This option is used to set the number of retry count times. A communication error dialog box will not appear unless the number of retry count times is reached. The range is within 0 ~ 255 times.
	Optimize	Use this option to enable optimization function. If optimization function is enabled, all read addresses of all related elements will be optimized.
	Size Limit	This function is available only when “Static” in “Optimize Type” option on Standard tab is selected. It is used to avoid the screen updating speed from slowing down when reading a long continuous address.
	When the check box next to “Communication Interrupt times then cancel connected” is checked, HMI will stop communicating with the external controllers after the communication interrupt times are reached. The purpose of this function is to avoid a communication error dialog box will show on the HMI screen when a communication error occurs after HMI has retried. The range is within 1 ~ 255 times. If the user wants to recover the communication between HMI and controller again when HMI stop communicating with the external controllers after the communication interrupt times are reached, the user can use Bit 0 of the control block D1 (suppose that the stating address is D0) to control HMI communication. When Bit 1 is set to ON, it will disable HMI communication. When Bit 1 is set to OFF, it will enable HMI communication. Please refer to Chapter 5 for more description.	
	HMI Station	It is used to set HMI station number. The range is within 0 ~ 255.
	PLC Station	It is used to set PLC station number. If PLC does not set station number, it will use this default setting. The range is within 0 ~ 255.

Communication tab in Configuration option		
	Interface	It is used to set communication interface. There are RS232, RS422 and RS485 three options. The default setting will be different depending on HMI type the user uses.
	Data Bits	There are 7 Bits and 8 Bits two options.
	Stop Bits	There are 1 Bits and 2 Bits two options.
	Baud Rate	Communication baud rate. There are 4800, 9600, 19200, 38400, 57600 and 115200 these options. The user can enter the setting value directly but the max. setting value can not exceed 187500.
	Parity	There are None, Odd and Even three options.

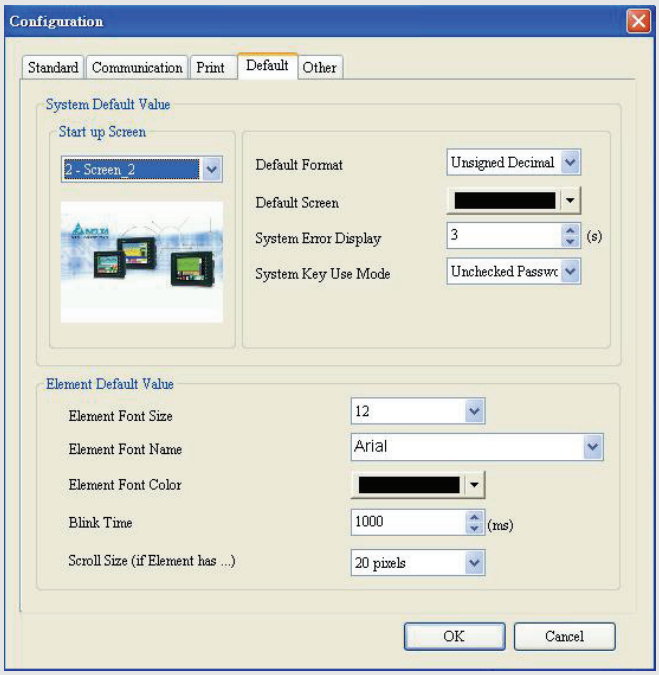
Table 2.9.3 Print Tab

Print tab in Configuration option		
		
HMI provides two print options, one is Hard Copy function, which can print the current screen and print one page one time. The other is Print Typesetting function. If Print Typesetting function is selected, no only the screen data but also all history data can be output to the printer directly. For more description of print setting method, please refer to the introduction of Print Typesetting function on page 2-109.		
Standard	Printer	Use this option to set the connecting printer. The user can use the drop-down list to specify the printer. The printers in the list are sorted by manufacturers and the user can find the printer easily.
	Paper	The user can use the Paper drop-down list to select the paper size. The predefined paper sizes in the list are A4 and Letter only.
	Quality	Only 72DPI option is provided.
Margin	The user can determine the blank space (margins) that will not be printed by using this option. This option can specify the top, bottom, left and right margins and the unit is mm.	

Interface	It is used to set printer interface. The user can specify the communication port of the printer. There are Parallel Port and USB two options. If Parallel Port is selected, the optional printer module, DOP-EXPM110 is needed.
Auto Next Page	When the “Auto Next Page” option is selected, the printer will print the next page automatically. If the checkbox next to “Auto Next Page” is not checked, the printer will print continuously without breaking for different pages.
Direction	It is used to set printing direction (orientation). There are Vertical (Portrait) and Horizontal (Landscape) two options.

Table 2.9.4 Default Tab

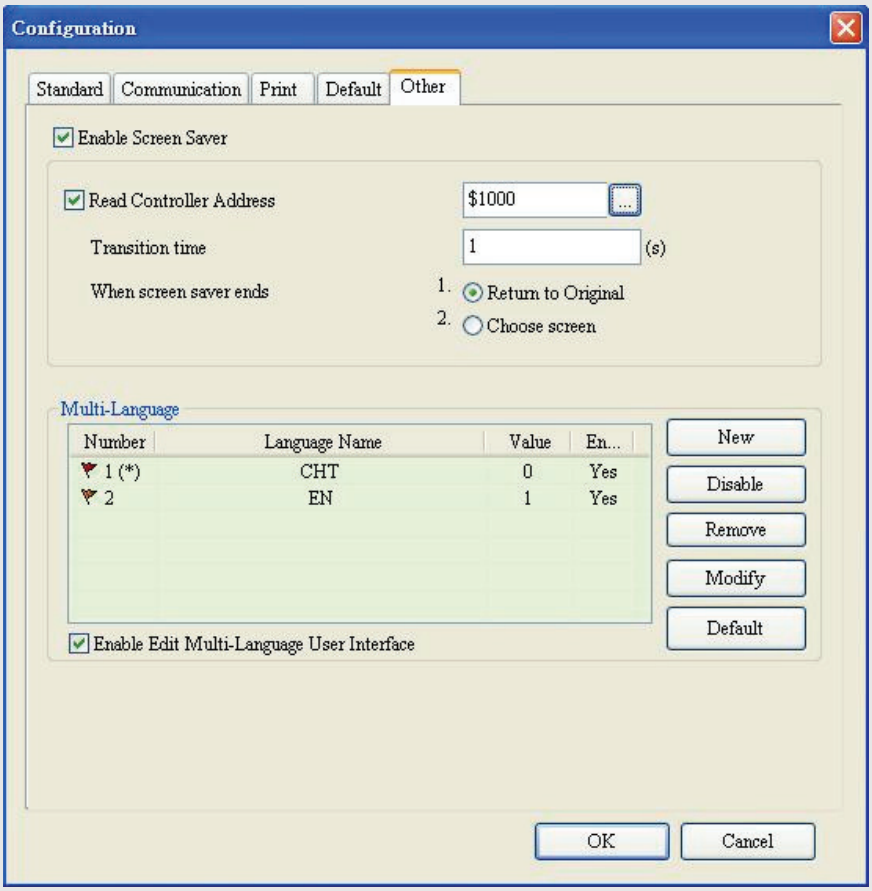
Default tab in Configuration option

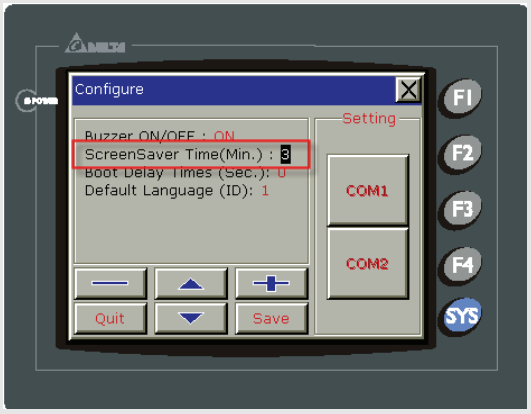


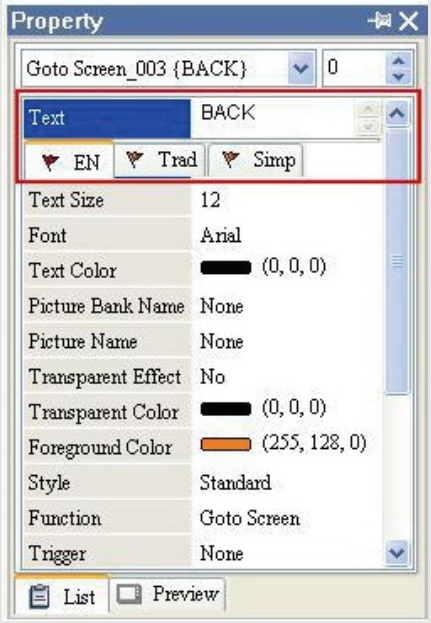
System Default Value	Start up Screen	Use this option to set the first display screen when HMI is powered on and started up.
	Default Format	When creating elements, it is used to set the default value format.
	Default Screen	When a new editing screen is created, the user can use this option to set the default screen background color.
	System Error Display Time	Use this option to set the display time of system error message dialog box. The range is within 0 ~ 5 seconds. **Please note that if the setting value is set to 0, it indicates that the system error message dialog box will not display on HMI screen.**
	System Key Use Mode	It is used to set the system key action when the user presses the key. There are **Disable**, **Check Password** and **Unchecked Password** three options.
Element Default Value	Element Font Size	It is used to specify the default element font size when creating an element.
	Element Font Name	It is used to specify the default element font name when creating an element.

Default tab in Configuration option		
	Element Font Color	It is used to specify the default element font color when creating an element.
	Blink Time	It is used to specify the default element twinkle time when creating an element.
	Scroll Size (if Element has…)	It is available for the element that has scroll function, e.g. Alarm History Table, etc. There are 20 pixels, 30 pixels and 40 pixels three options.

Table 2.9.5 Other Tab

Other tab in Configuration option		
		
Screen Saver	In **Screen Management** option on page 2-52, there is a more detailed description for introducing how to drag the mouse to determine the screen saver display.	
	Enable Screen Saver	This option should be selected when the user wants to use **Edit Save Screen** function in **Screen Management** option. If this option is not selected, even though the user has chosen the Edit Save Screen function, the screen saver will not be started up.
	Read Controller Address	1. The user can use this option to enable the screen saver. When the setting value is 0, it indicates that the screen saver function is disabled. If the setting value is a non-zero value, it indicates that the screen saver function is enabled. When the user touches the HMI screen, the screen saver function is ineffective.

Other tab in Configuration option		
	Read Controller Address	2. If this option is not selected, the screen saver will be enabled automatically when the **Screen Saver Time** set in HMI is reached. Please refer to the figure below. If the screen saver function is enabled, the user can touch the HMI screen to disable it. If the **Screen Saver Time** is set, but the user does not choose the screen saver, the screen will become black when the screen saver function is enabled. 
	Transition time	This option can set the transition time between two screen savers. The range is within 1 ~ 255 second.
	When screen saver ends	1. Return Original: Return to the original screen at that time when the screen saver is enabled. 2. Choose screen: Specify the screen that will show after the screen saver program ends.
Multi-Language	New	Pressing New button can add a language option.  As shown as the figure above, the user has to enter the language name and setting value. The setting value will be referred by the system when setting multi-language. The range of the setting value is within 0 ~ 255. Setting language name is easy for text editing. The user can press  button to change the flag color on the language name tab.
	Enable/Disable	Delta HMI allows the user to edit multi-language screen, however the user can use this option to determine which languages are supported (enabled) or not supported (disabled) as the user wishes when downloading data to HMI.
	Remove	Remove the existing language. Keep at least one language for a project.
	Modify	Modify the existing language name and setting value.

Other tab in Configuration option		
	Enable Edit Multi-Language User Interface	Use this option can enable multi-language user interface. The user can view multi-language display in property table if this option is selected. The editing interface will be shown as the figure below: 

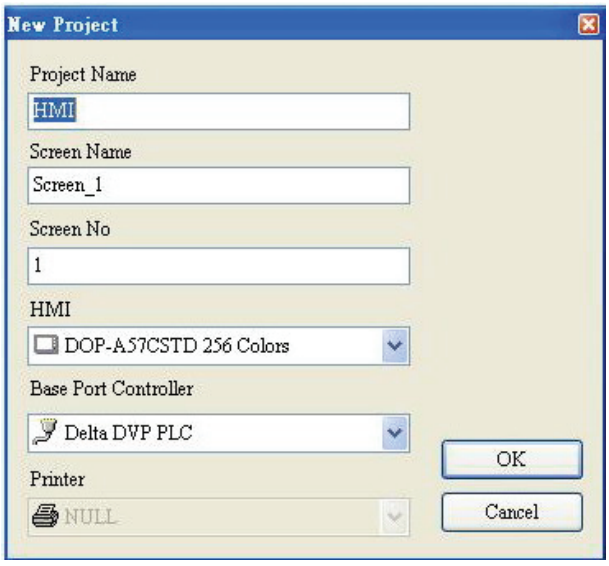
Multi Language Function Example

Example:

Create a Screen that has “English”, “Traditional Chinese” and “Simplified Chinese” three languages selection for the user to switch. Also, teach the user how to set an “Increment” button to switch the language selection within the screen.

1. Create a new project.

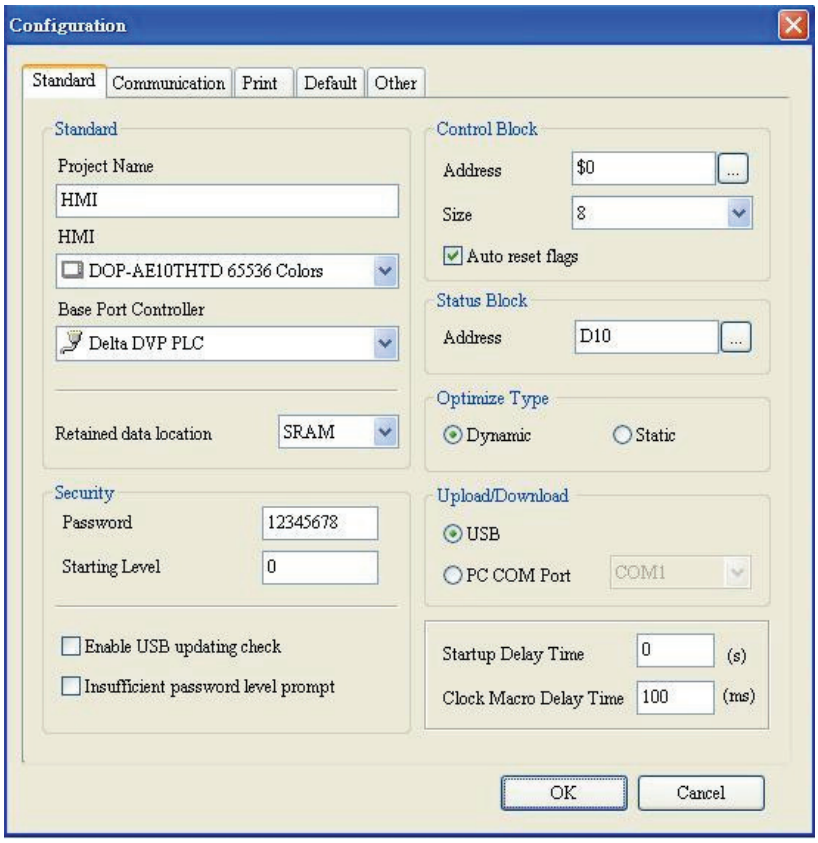
 Select HMI model “DOP-A57CSTD 256 Colors”.



2. Create two button elements on the screen. “Set” and “Increment” these two button elements.

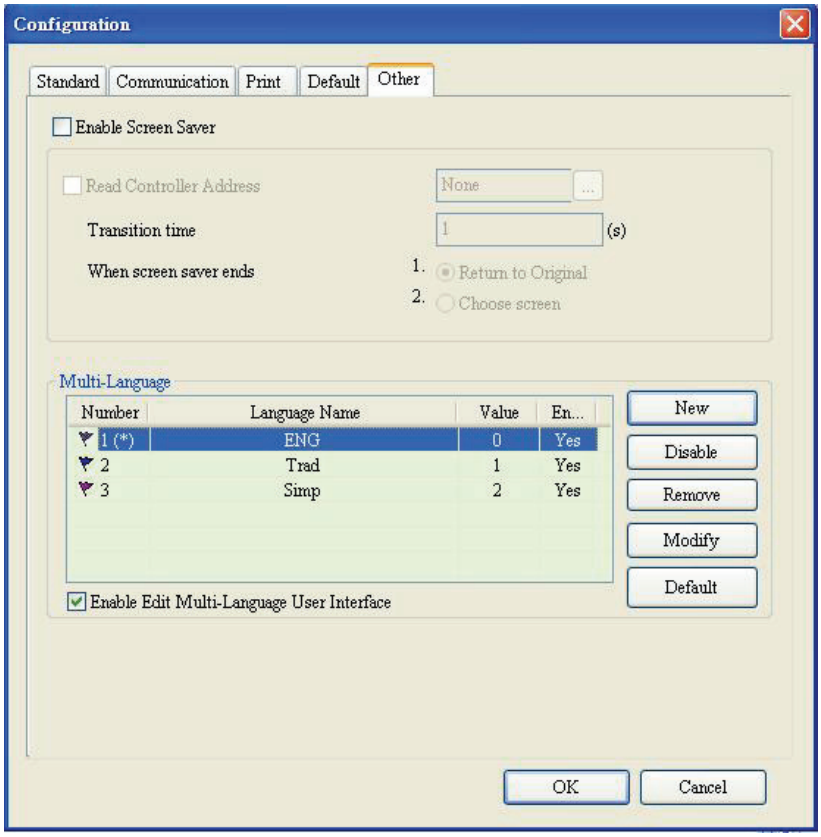
3. Control Block (Options > Configuration) Settings

 Set the address as $200 and set the size is 8.

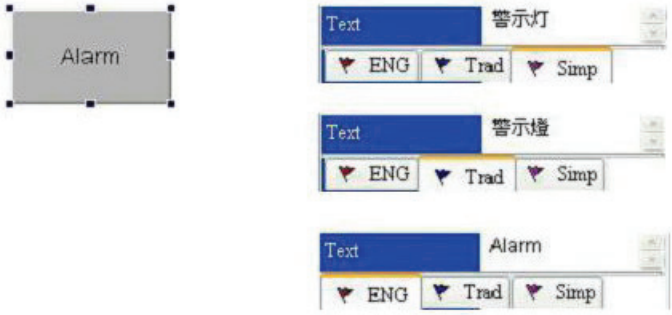


4. Multi-Language Settings

 Add “English”, “Traditional Chinese” and “Simplified Chinese” three languages. The setting value are 0,1 and 2 for each language respectively.

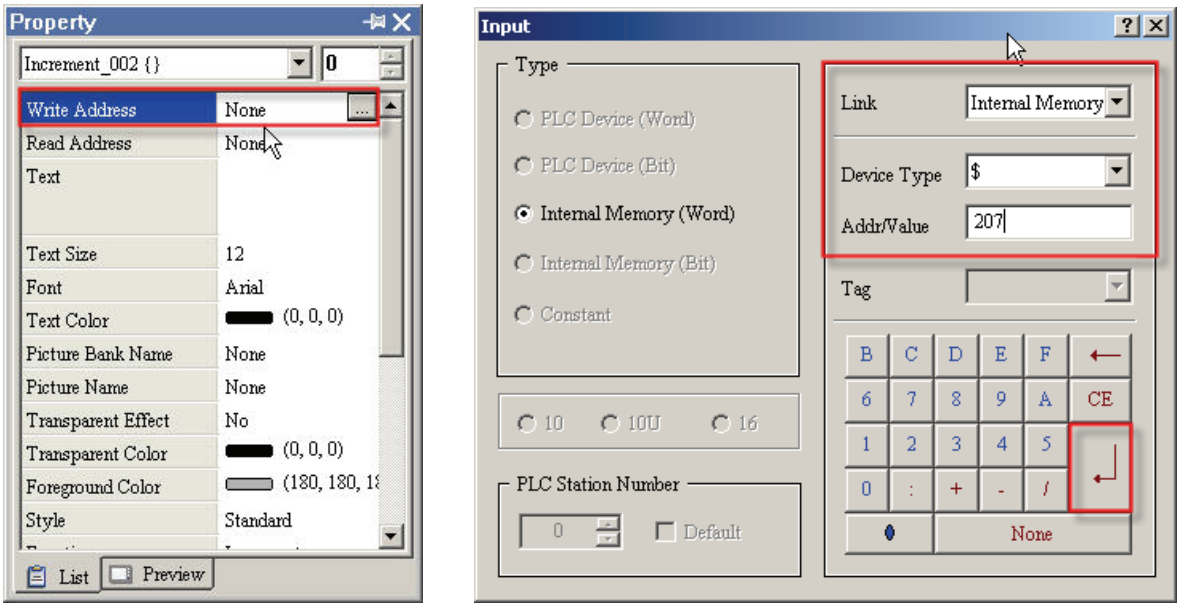


5. Set the display text of “Set” button element in different languages.

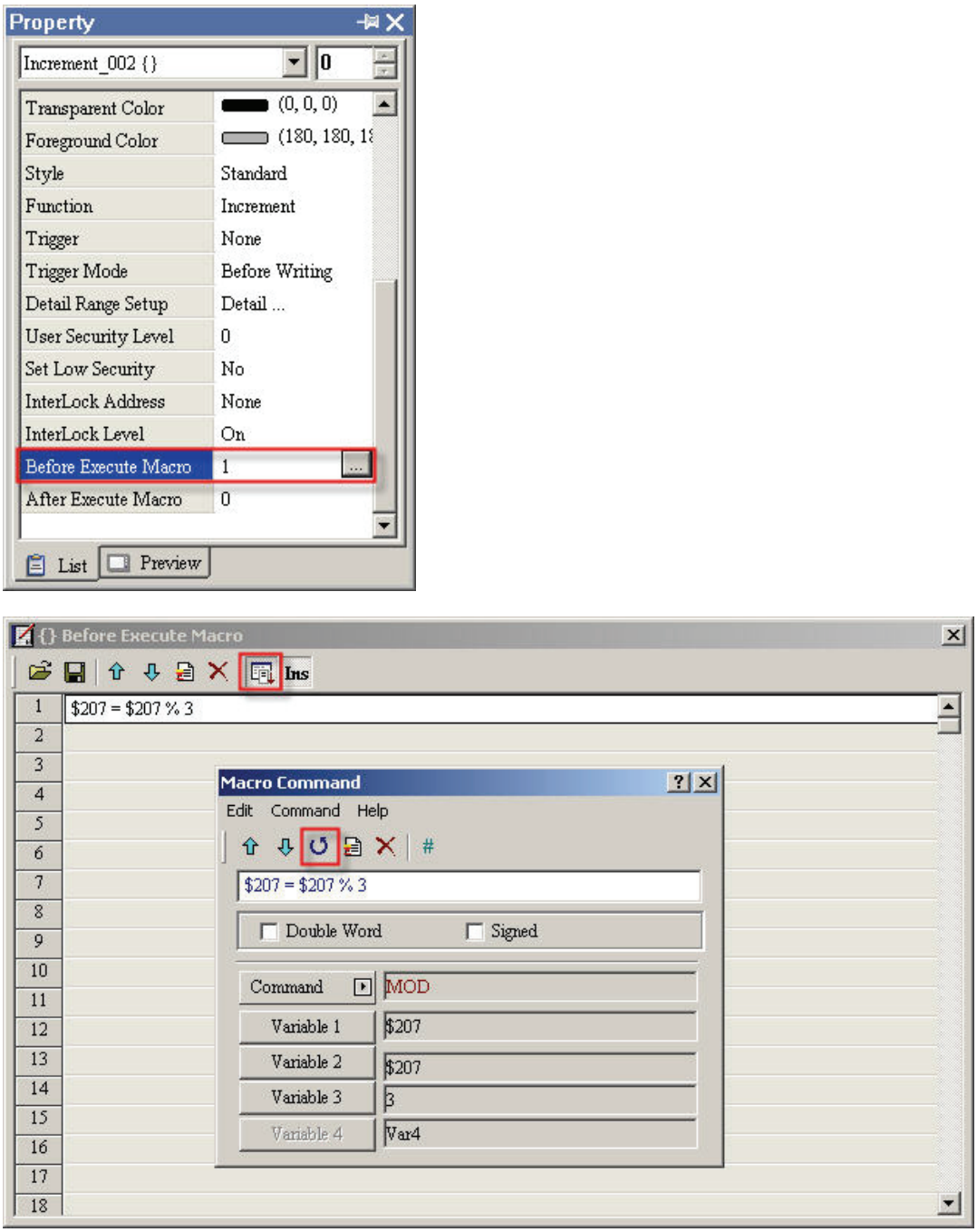


- Double click the “Simplified Chinese” and enter “警示灯” in Simplified Chinese”
- Double click the Traditional Chinese tab and enter “警示燈” in Traditional Chinese.
- Double click the English tab and enter “Alarm” in English.

6. In property setting of “Increment” button element, please set the write address as the **internal memory $207**.

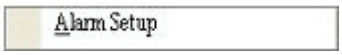


7. Then, set the setting value of “Before Execute Macro”. The user can enter the Macro command as **$207=$207%3**.



8. Select **Compile** command and execute **Off Line Simulation**. Then, the user can see the text of the "Set" button is changed in different language by pressing the "Increment" button element.

■ Alarm Setup



The user can set alarm by clicking **Options** > **Alarm Setup**. The alarm setup should set with the alarm function in element settings. HMI will execute alarm function automatically if both settings are all set. When the specified conditions are matched (If condition occurs in specific address, ON enabled or OFF enabled) after setting, HMI will display an Alarm Setup warning dialog box automatically. In this dialog box (Fig. 2.9.2), there are Delete, Modify, Import, Export and OK buttons for the user to use. For more information for the settings of Alarm Setup, please refer to the Table 2.9.6 on the following pages and Chapter 3 for more description.

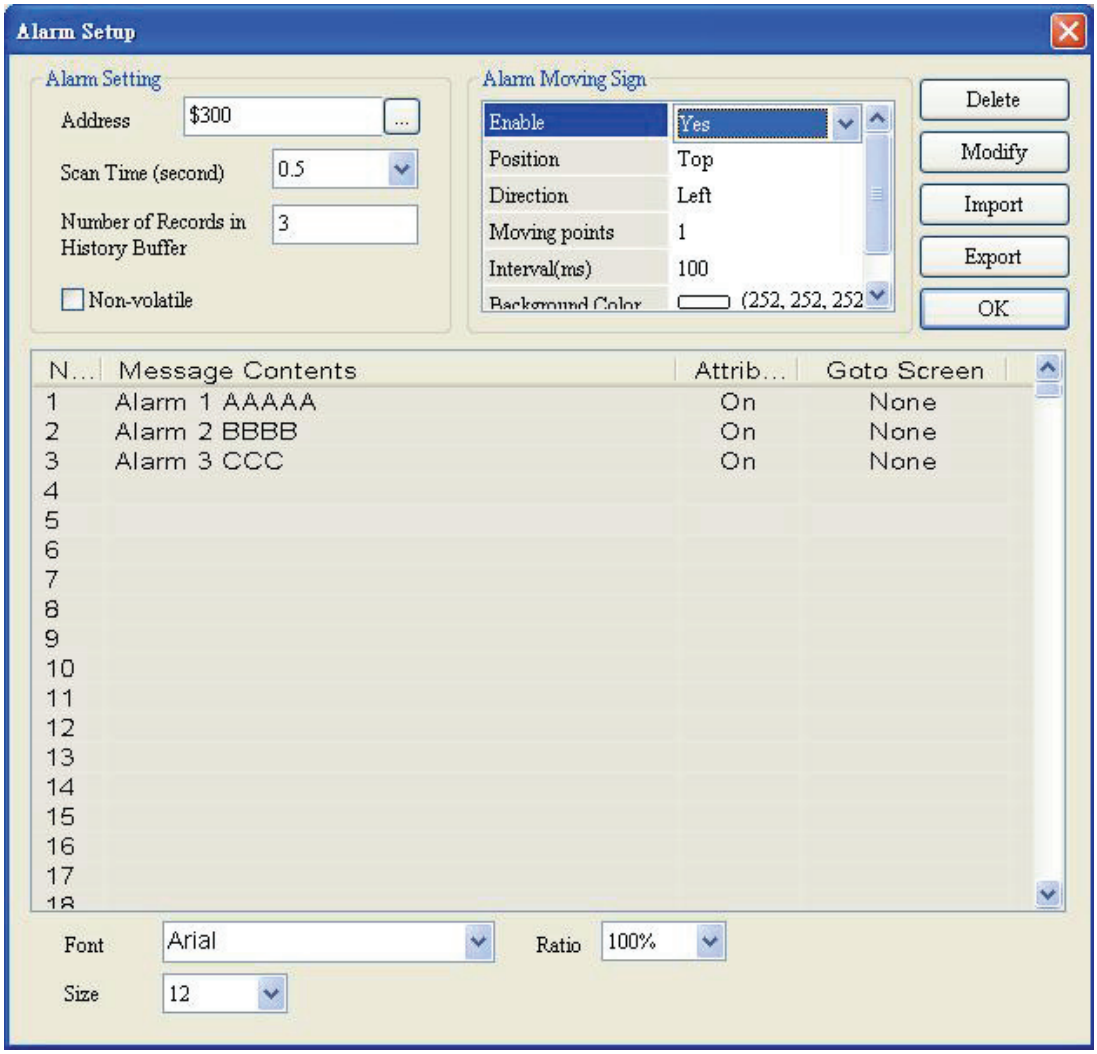
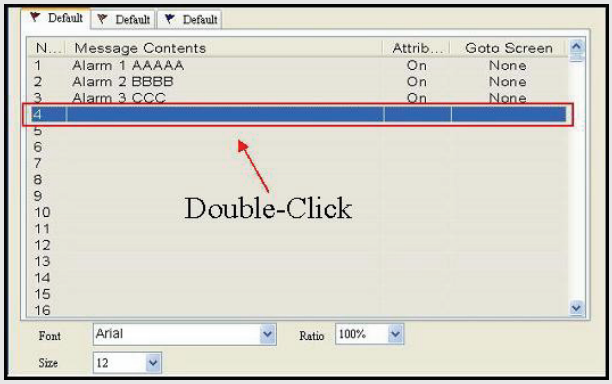
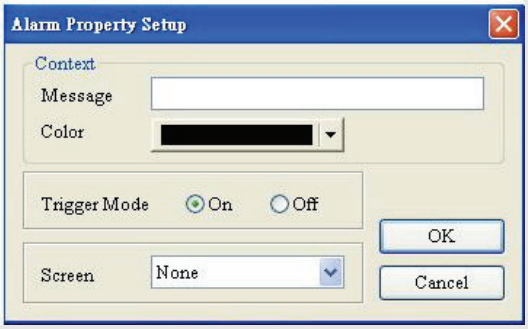


Fig. 2.9.2 Alarm Setup Dialog Box

Table 2.9.6 Alarm Setup Settings

Alarm Setup Dialog Box		
Alarm Setting	Address	Use this option to set the alarm starting address. It provides 512 alarms, 32 Words. Please note that the unit of this address is Word. If the connecting controller is Delta PLC, when the register type is M or S, the address must be 0 or the multiple of 16, i.e. M0 and M16. If the address is M1, system will determine it is an invalid address.
	Scan Time (second)	It is used to set the how long the HMI scan one time. The unit is second.

<table>
<tr><th colspan="4">Alarm Setup Dialog Box</th></tr>
<tr><td rowspan="11"></td><td>Number of Records in History Buffer</td><td colspan="2">Use this option to save data in order. When the number of records exceeds this setting value, it will delete the records from the first record and insert the new record again.</td></tr>
<tr><td>Non-volatile</td><td colspan="2">Using this option can enable to save data in SRAM when the power is turned off. The capacity for saving alarm data of DOP-AS series is 4KBytes, DOP-A series is 8KBytes and DOP-AE series is 16KBytes. (The power of SRAM is battery when the power is turned off.) (In some HMI models, the user can save data in USB flash drive or SM card when the power is turned off and the capacity for saving alarm data depends on the capacity of USB flash drive or SM card.)</td></tr>
<tr><td rowspan="5">Alarm Property Setup</td><td colspan="2">The user can double click a row of the alarm message contents table to edit the alarm property.
(Please note that there are three languages tabs in Alarm Setup dialog box since multi-language function is also supported here. The user can click the tab to edit the alarm message contents according to the user's requirement.)


The following Alarm Property Setup dialog box will display after double clicking the row.

</td></tr>
<tr><td>Message</td><td>Display message when an alarm occurs.</td></tr>
<tr><td>Color</td><td>Display message color when an alarm occurs.</td></tr>
<tr><td>Trigger Mode</td><td>Use this option to determine if the Bit is On or Off when an alarm occurs.</td></tr>
<tr><td>Screen</td><td>Display screen when an alarm occurs.</td></tr>
<tr><td>Delete</td><td colspan="2">Delete the alarm message contents.</td></tr>
<tr><td>Modify</td><td colspan="2">Modify the alarm message contents. The user also can double click the mouse to perform this function.</td></tr>
<tr><td>Import</td><td colspan="2">Import the Alarm Describe File into the alarm message contents table.</td></tr>
<tr><td>Export</td><td colspan="2">Export the alarm message contents from HMI and convert them to be a Alarm Describe File.</td></tr>
<tr><td>OK</td><td colspan="2">Compete the settings and exit the Alarm Setup dialog box.</td></tr>
</table>

<table>
<tr><th colspan="4">Alarm Setup Dialog Box</th></tr>
<tr><td></td><td colspan="3">The calculation method of the size of the alarm history file is as follows:
$\{[6Bytes(a)+2Bytes(b)]\times N(c)\}+4Bytes(d)=$ Actual File Size Bytes

<table><tr><td>a</td><td>Time and Date Data</td></tr><tr><td>b</td><td>Alarm Data</td></tr><tr><td>c</td><td>Sampling Points</td></tr><tr><td>d</td><td>Data File Symbol</td></tr></table>
Example:
If the Number of Records in History Buffer is set to 100, and the time and date is recorded, the required capacity for saving alarm data is:
[(6 Bytes + 2 Bytes) × 100] + 4 Bytes= 804 Bytes
If the Number of Records in History Buffer is set to 100, and the time and date is not recorded, the required capacity for saving alarm data is:
(2 Bytes × 100) + 4 Bytes = 204 Bytes

The calculation method of the size of the alarm frequency table is as follows:
$2Bytes(a)\times N(b)=$ Actual File Size Bytes

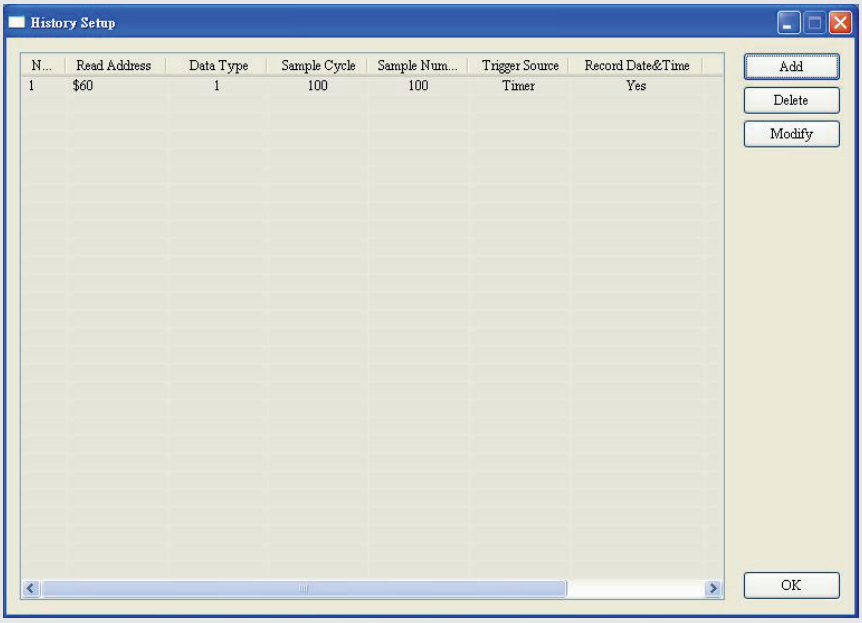
<table><tr><td>a</td><td>Alarm Frequency Data</td></tr><tr><td>b</td><td>Alarm Type</td></tr></table>
Example:
If there are five alarm types, the required capacity for saving alarm data is:
2 Bytes × 5 = 10 Bytes</td></tr>
<tr><td rowspan="8">Alarm Moving Sign</td><td>Enable</td><td colspan="2">It is used to enable the alarm moving sign.</td></tr>
<tr><td>Position</td><td colspan="2">It is used to determine the display position of alarm moving sign. It can be Top or Bottom.</td></tr>
<tr><td rowspan="4">Direction</td><td>Left</td><td>Alarm message will move from right to left (Move to left).</td></tr>
<tr><td>Right</td><td>Alarm message will move from left to right (Move to right).</td></tr>
<tr><td>Up</td><td>Alarm message will move from bottom to top (Move to Up).</td></tr>
<tr><td>Down</td><td>Alarm message will move from top to bottom (Move to Down).</td></tr>
<tr><td>Moving points</td><td colspan="2">It is used to set the moving points every time for the alarm moving sign. The unit is Pixel and the range is within 1 ~ 50 points.</td></tr>
<tr><td>Interval (ms)</td><td colspan="2">It is used to set the interval time every time for the alarm moving sign. The unit is ms and the range is within 50 ~ 3000 ms.</td></tr>
<tr><td>Background Color</td><td colspan="2">It is used to set the background color of the alarm moving sign.</td></tr>
</table>

- **History Setup**

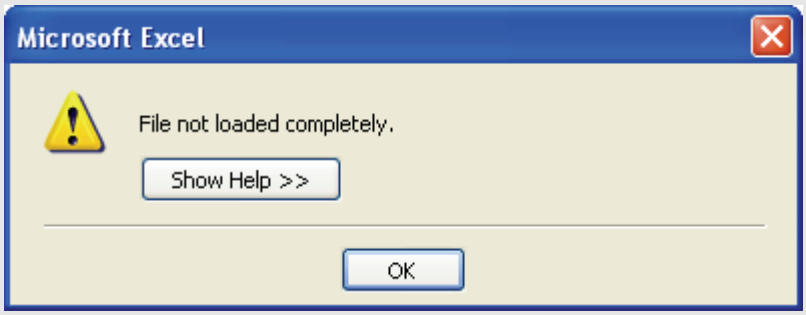


History Setup should be used with sampling elements. Please refer to Chapter 3 for more detailed information.

Table 2.9.7 History Setup Settings

<table>
<tr><th colspan="3">History Setup Dialog Box</th></tr>
<tr><td colspan="3">
</td></tr>
<tr><td>Add</td><td colspan="2">Pressing Append button can add a history data. Max. 12 history data can be added. After the Add button is pressed, the following Buffer Properties dialog box will display.

</td></tr>
<tr><td></td><td>Read Address</td><td>It is used to set the starting address for sampling the history data.</td></tr>
<tr><td></td><td>Data Length (Word)</td><td>It is used to set how many Words the user wants to sample? The range is within 1 ~ 13 continuous Words. It indicates that max. 13 continuous words can be sampled.</td></tr>
<tr><td></td><td>Cycle (ms)</td><td>It is used to set the sampling cycle time for reading address (how long it is to read address one time). If the Trigger option is PLC, the sampling operation is controlled by the Control Flag Register for Sampling History Buffer. The range of the sampling cycle time is within 100 ~ 86400000 ms.</td></tr>
<tr><td></td><td>Sample Number</td><td>This option is used with the Auto Stop option. If the Auto Stop option is selected, HMI will stop recording the data after the numbers of records have reached the setting value of Sample Number option. If the Auto Stop option is not selected, when record number of data exceeds the setting value of Sample Number option, it will delete the records from the first record and insert the new record again. The record data will be name as “History.dat” and the user need to use the software, Data Access which is attached in HMI editing software, to open this file. Data Access will sort and list the history data by record time automatically.</td></tr>
</table>

History Setup Dialog Box		
	Stamp Time and Date	Use this option to determine if the time and date are also recorded during sampling operation.
	Auto Stop	Use this option to determine if HMI stop recording when the max. number of record data is reached.
	Non-Volatile	Using this option can enable HMI to save sampling data in SRAM. The capacity for saving history data of DOP-AS series is **120Kbytes**, DOP-A series is **240KBytes** and DOP-AE series is **360KBytes**. (In some HMI models, the user can save data in USB flash drive or SMC card and the capacity for saving history data depends on the capacity of USB flash drive or SMC card.)
	Export CSV File	The data can be exported to a CSV file for the user to read and edit more easily in the Windows@ Excel or other text editing tool. It allows the user to read max. 65536 rows and 256 columns of data in the Windows@ Excel environment. If the sample number of the sampling data exceeds 65536, when the user uses Windows@ Excel to open the CSV file, an error message will display. At this time, the user can use Notepad or other text editing tool to open the CSV file.  If Auto Stop option is selected also, HMI will stop recording the data after the numbers of records have reached the setting value of Sample Number option. If Auto Stop option is not selected, when record number of data exceeds the setting value of Sample Number option, it will delete the records from the first record and insert the new record again. But, the data of the exported CSV file will not be sorted and listed by the record time.
	Trigger	There are Timer and PLC two options. It means that the sampling action is controlled by the Timer of the HMI or the external controller, i.e. PLC. When PLC option is selected, it indicates that the trigger bit designated by the register for sampling history buffer in the control block control the sampling action. Regarding the settings of the control block, please refer to Chapter 5.
	OK / Cancel	Press OK button to save the data and exit. Press Cancel to exit without saving data.
Delete	Pressing Delete button will delete history data.	
Modify	Pressing Modify button can modify a history data.	

History Setup Dialog Box

The calculation method of the size of the history data file is as follows:

1. dat file

$$\frac{\{[6Bytes(a)+2Bytes(b)]\times N(c)\}}{1024\times 1024}+8Bytes(d)=\text{Actual File Size } MBytes$$

a	Time and Date Data
b	Alarm Data
c	Sampling Points
d	Data File Symbol

Example:

Suppose that the user adds two history data. The data length of the fist history data is set to 1 and the sample number of the first history data is set to 10000. The data length of the second history data is set to 2 and the sample number of the second history data is set to 20000. Both these two history data all have the time and date recorded, so the required dat file capacity for these two history data are:

The file capacity of the first history data = [(6Bytes + 2Bytes) × 10000] + 8 Bytes = 80008Bytes.

The file capacity of the second history data = [(6Bytes + 2 × 2Bytes) × 20000] + 8 Bytes = 200008Bytes.

Total require: 80008Bytes + 200008Bytes = 280016Bytes = Approx. 0.268Mbytes.

2. csv file

$$\frac{N(a)\times 240Bytes}{1024\times 1024}=\text{Actual File Size } MBytes$$

a	Sampling Points

Example:

Suppose that the user adds two history data. The data length of the fist history data is set to 1 and the sample number of the first history data is set to 10000. The data length of the second history data is set to 2 and the sample number of the second history data is set to 20000. Both these two history data all have the time and date recorded, so the required csv file capacity for these two history data are:

The file capacity of the first history data = = 10000 × 240Bytes = 2400000Bytes.

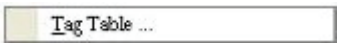
The file capacity of the second history data = 20000 × 240Bytes = 4800000Bytes.

Total require: 2400000Bytes + 4800000Bytes = 7200000Bytes = Approx. 6.8Mbytes.

The capacity of USB flash drive and SM Card provided by DOP-A series HMI:

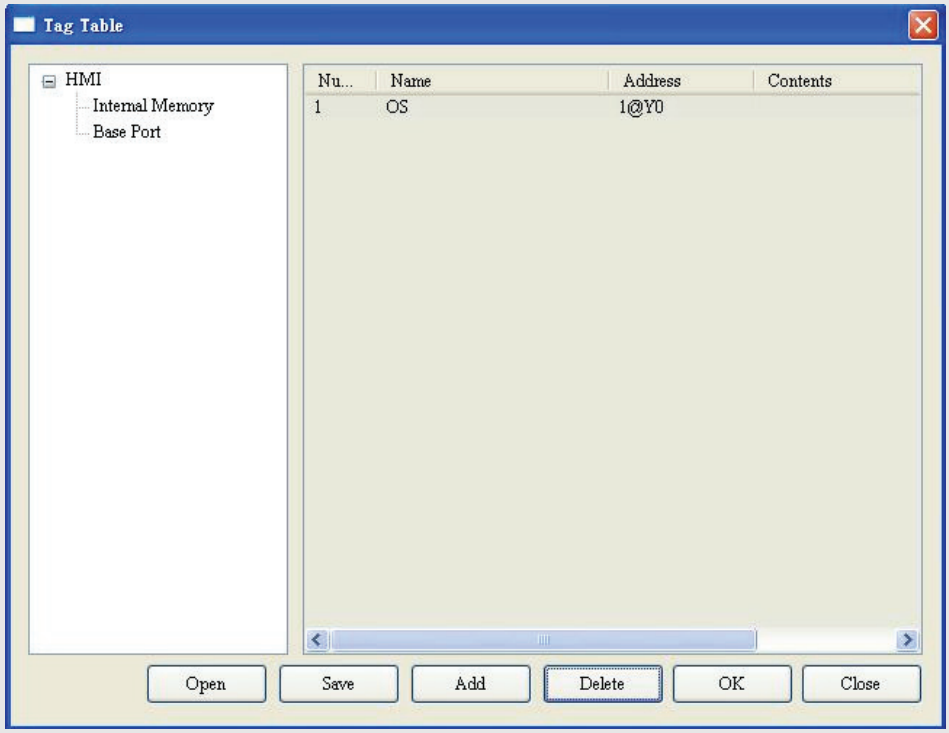
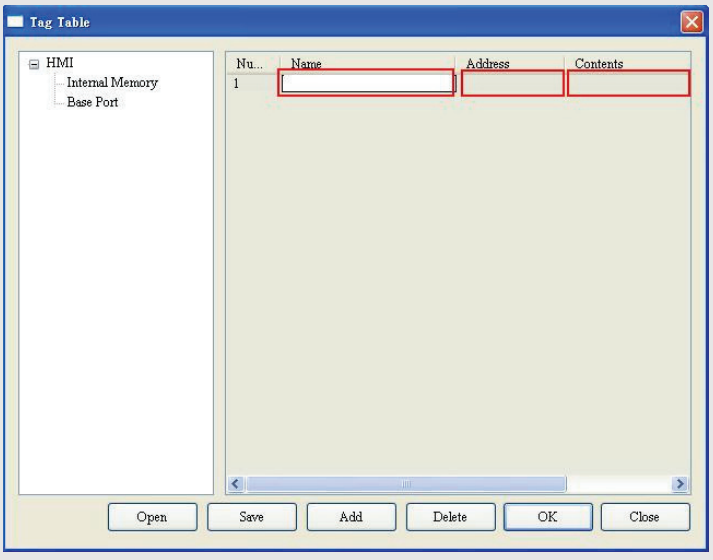
HMI Model	USB Flash Drive	SM Card
AS38	128 MB	N/A
A57	N/A	No Limit
A75	N/A	No Limit
A10	N/A	No Limit
AE57	N/A	No Limit
AE80	1GB	No Limit
AE94	1GB	N/A
AE10	1GB	No Limit

■ Tag Table



It is used to replace the specific address with the user-defined words or characters. For example, if the user wants to replace PLC address 1@Y0 with the word “OS”, just define it in Tag Table option in advance.

Table 2.9.8 Tag Table Settings

Tag Table Dialog Box	
	
Open	Open a Tag File and import it into HMI.
Save	Save the settings or changes made in Tag Table dialog box as a Tag File.
Add	Please select the Tag type first, Internal Memory and Base Port (If the user has three or above communication ports, the user will see Link2, Link3 …and vise versa). Then, press Add button to add and define Tag data. 

Tag Table Dialog Box	
Delete	The user can use the mouse to select one row of the Tag table, and then press Delete button to delete it.
OK	Press OK button to save the settings and exit.
Cancel	Press Cancel to exit without saving.

- **Print Typesetting**



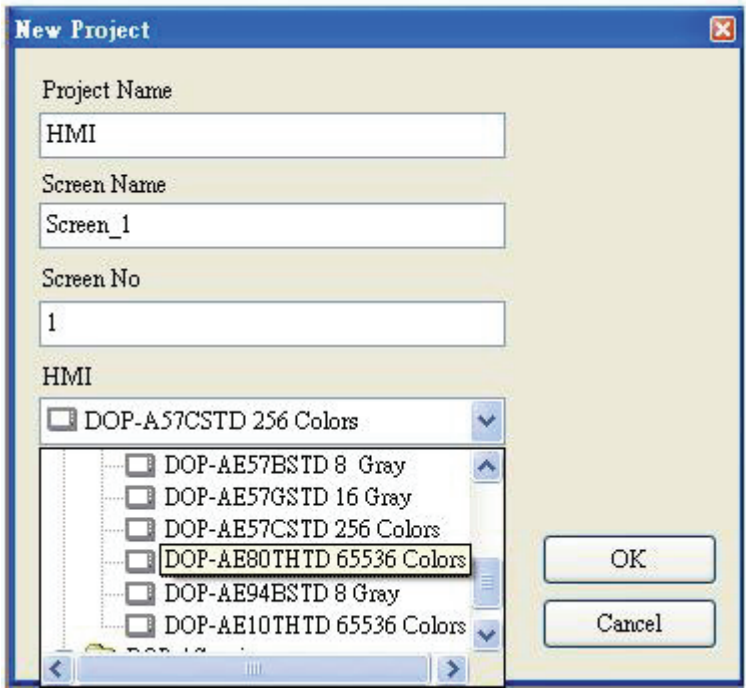
Provide more efficient print layout management function. Please refer to the examples on the following pages.

Print Function

Example:

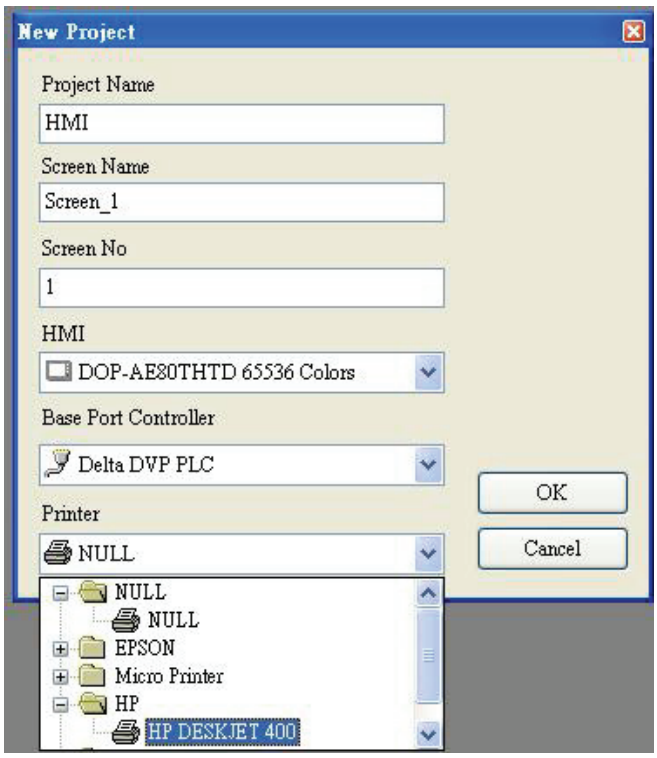
Printer and Page Setup

1. Print function only provided in DOP-AE and AS series.



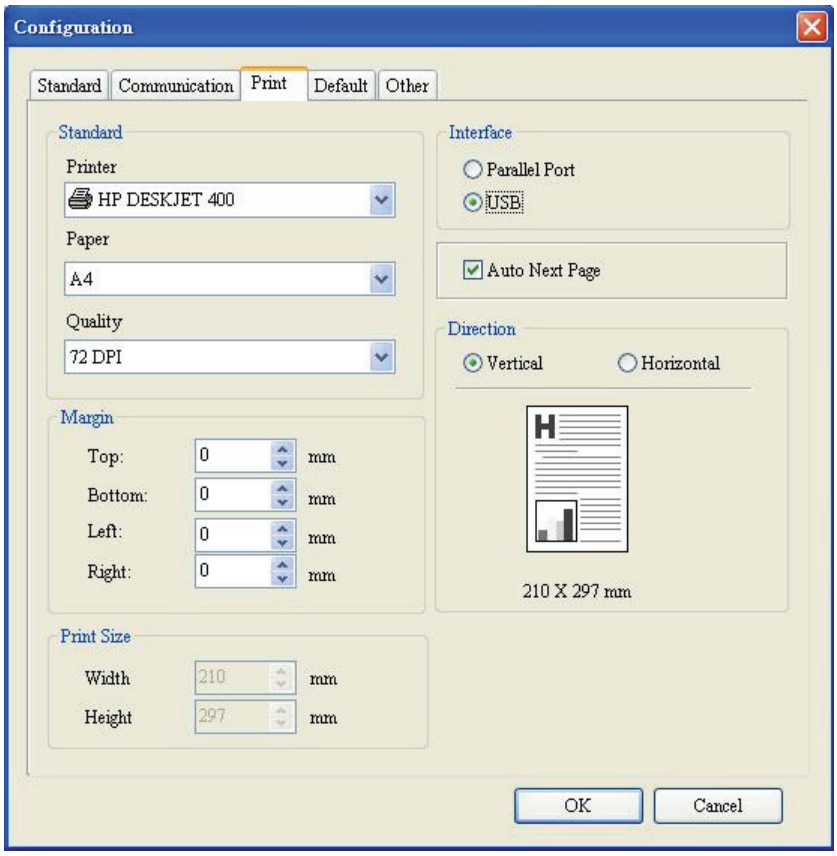
2. Select Printer

 The user can click **File** > **New** to get into the New Project tab and select the printer using the “Printer” drop-down list in New Application tab. Or click **Options** > **Configuration** > **Print** to select a printer.



3. Configuring Print Setup

The user can click **Options** > **Configuration** > **Print** to enter into “Print” tab. Then, use the Print tab to configure the settings of printer, paper, quality and margin, etc. options.



Print Typesetting Function

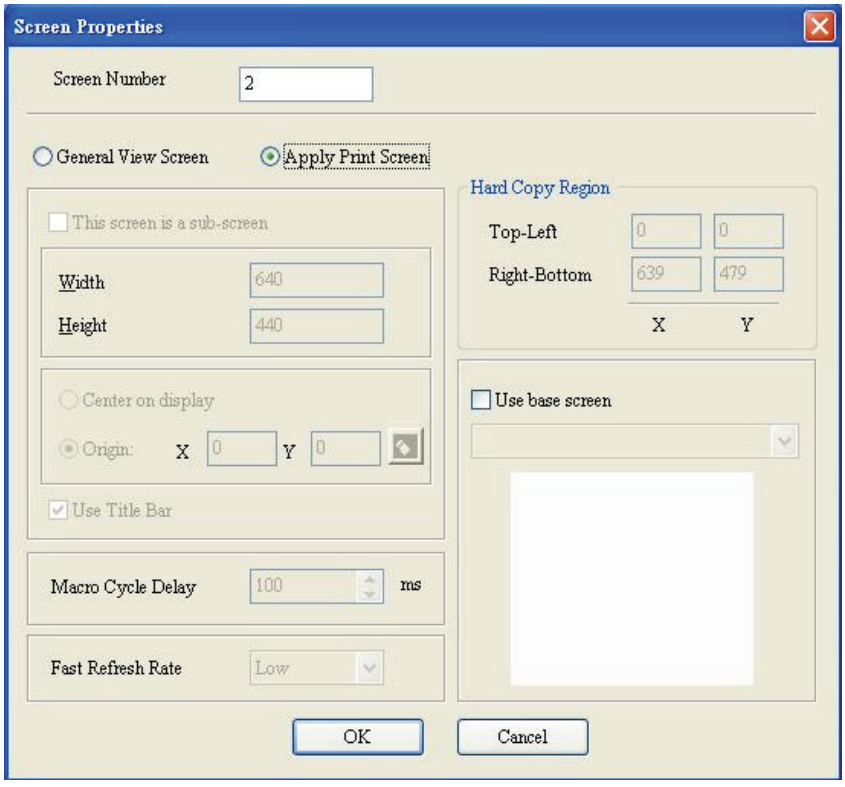
The user can print many pages one time and arrange the layout of the print screen by using print typesetting function. The history data also can be printed at the same time. Please pay particular attention to the following notes when using print typesetting function.

1. The screen cannot be designated to print typesetting screen when switching HMI screen.
2. Print typesetting screen cannot be the default HMI screen.
3. Print typesetting screen cannot be the base screen.
4. Print typesetting screen cannot be the screen saver.
5. Print typesetting screen cannot be the sub-screen.

Create Printing Report

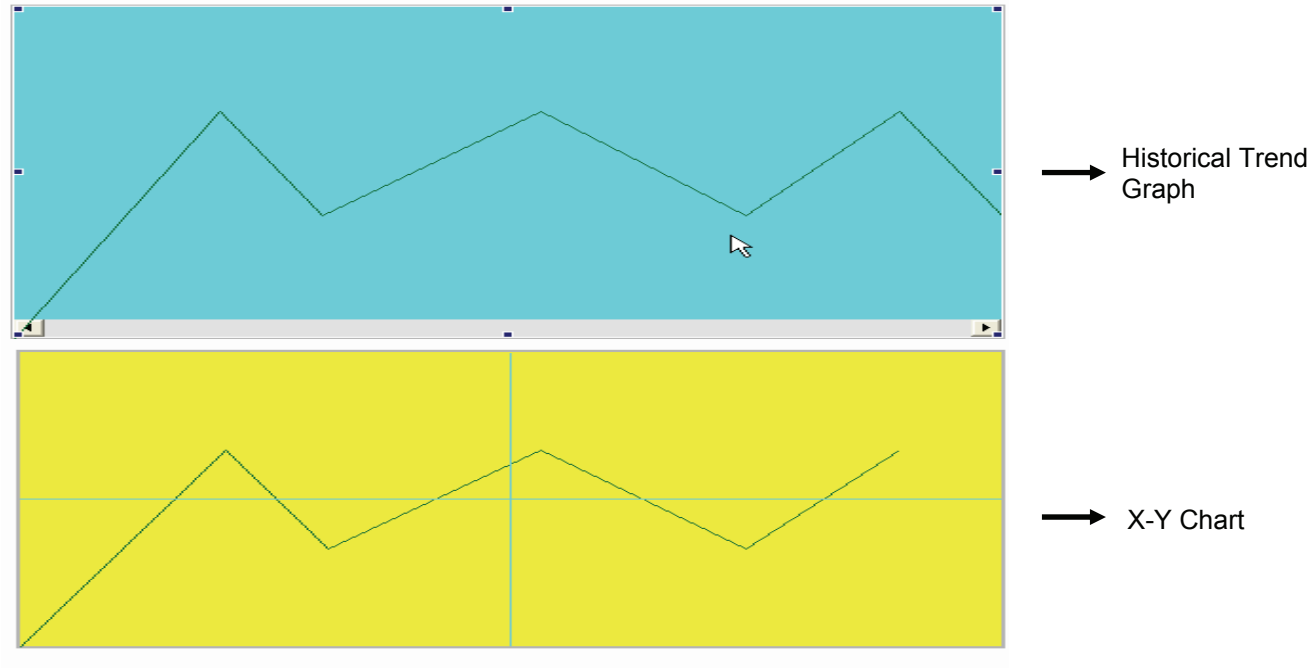
Step 1:

Creating a new screen first (Click **Screen** > **New Screen**) and set it as **Apply Print Screen** in Screen Properties tab (Click **Screen** > **Screen Properties**). For the description of Apply Print Screen function, please refer to Table. 2.7.2 Screen Properties setting on page 2-59.



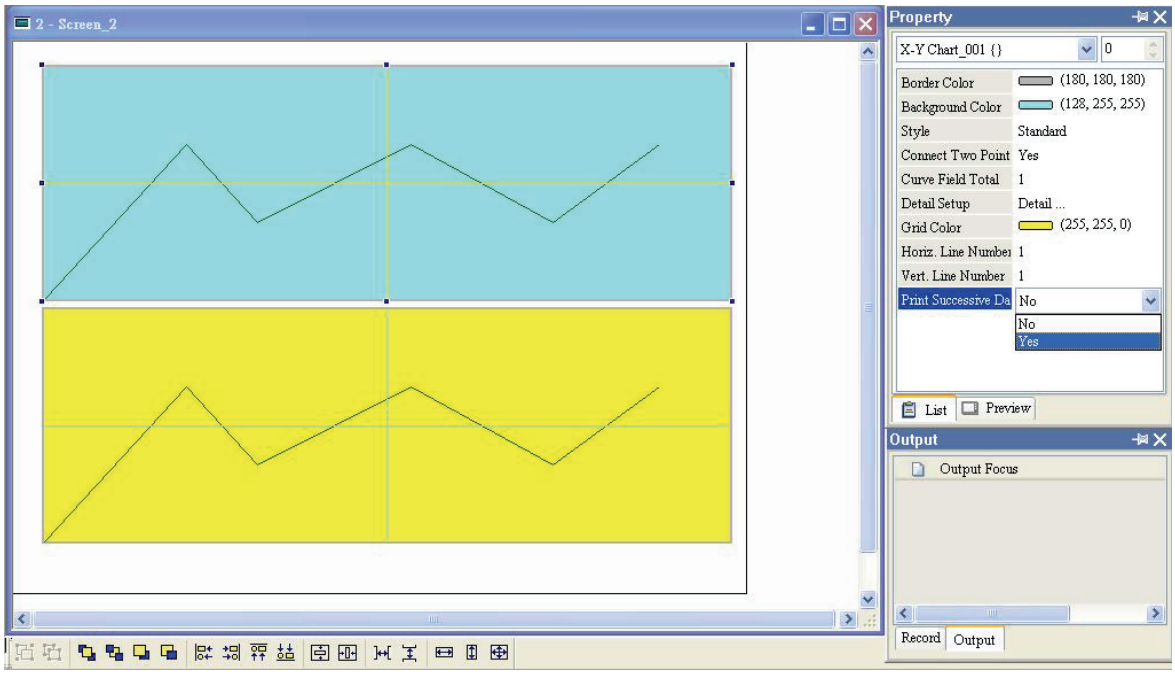
Step 2:

Create the element that the user wants to print out. For example, if the user wants to print a Historical Trend Graph and a X-Y Chart, the user can create a Historical Trend Graph (Click **Element** > **Sampling** > **Historical Trend Graph**) and a X-Y Chart (Click **Element** > **Curve** > **X-Y Chart**) first and then set their properties in the Property table. The Property table provides element property setting for each element. For the information for element property settings for each element, please refer to Chapter 3 for more detailed description.



Step 3:

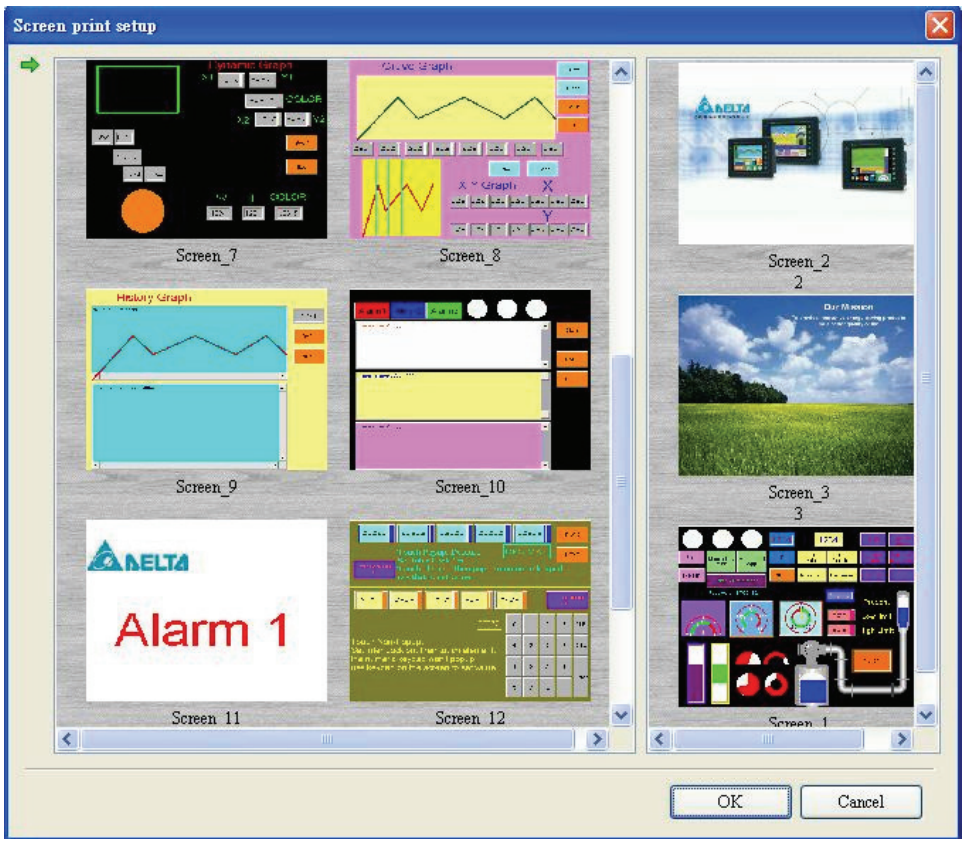
The user can choose “Yes” or “No” using the “Print Successive Data” drop-down list to determine whether Print Successive Data function is selected or not. When “Yes” is selected, it indicates that Print Successive Data function is enabled, and all the sampling records and data for the element will be printed out completely.



Print Screen Layout and Output

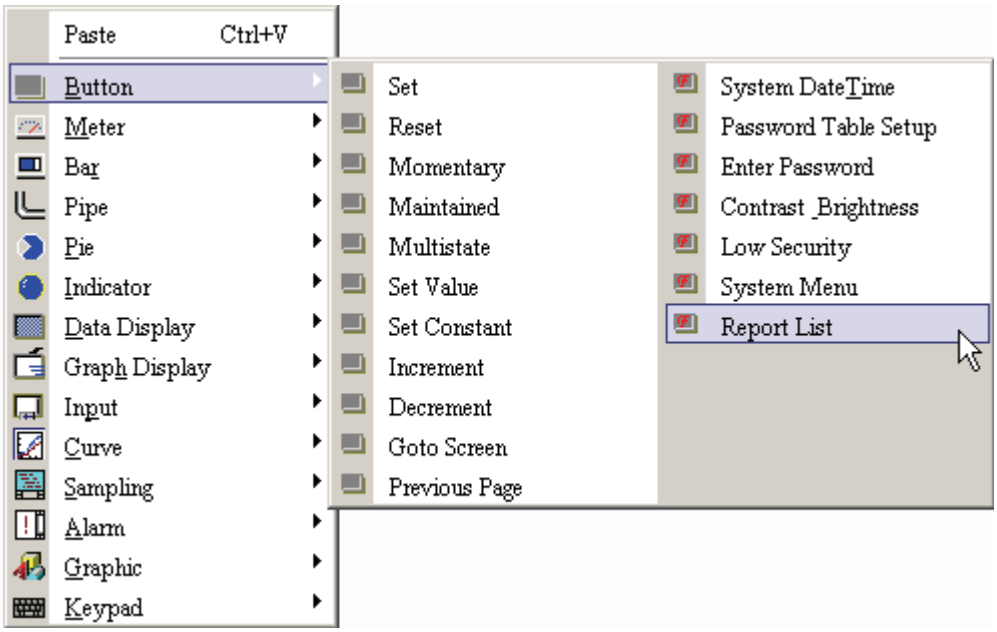
Step 1:

Click **Options** > **Print Typesetting**. Then drag the mouse to decide which screen needs to be typeset and printed out. The screens on the left side are all created screens and the screens on the right side are the selected screens. If a “General View Screen” is dragged to the right side, it will become “Apply Print Screen” (Screen Properties) automatically.



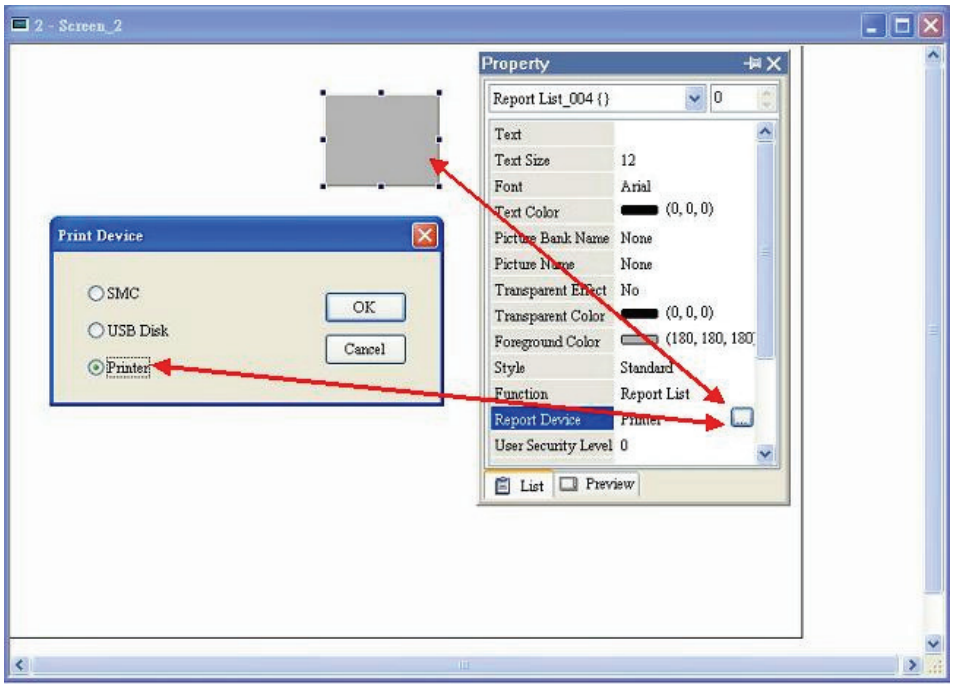
Step2:

Right clicking the mouse or use a function key to create a “Report List” button on a “General View Screen”. Then, use this “Report List” button to enable the print function.



Step 3:

Set the properties of the “Report List” option. The Report Device can be SMC, USB flash drive, and Printer. Please note that if the user selects SMC or USB flash drive, the data will be sent to the SMC or USB flash drive only and it will not be printed out.



Step 4:

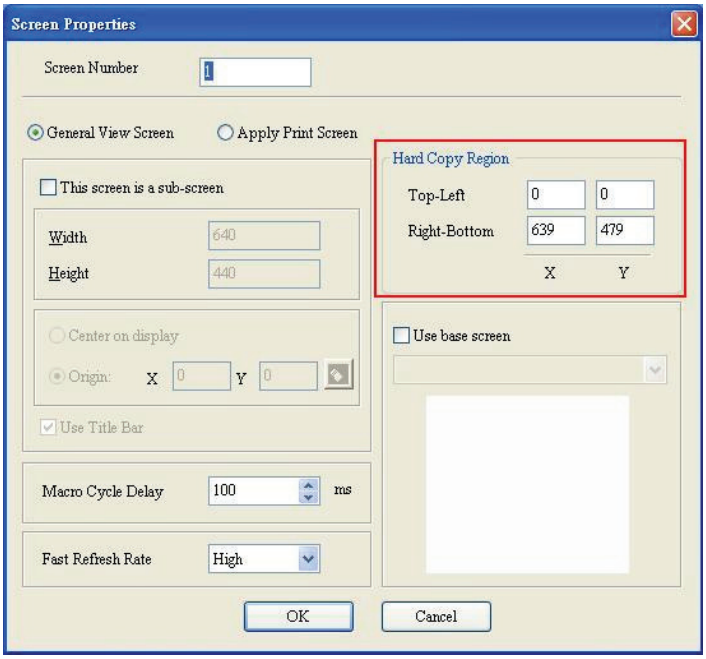
Connect to the printer and startup the HMI. When “Report List” button is pressed, the printer will start to print. Please note that it will take some time when there are too many print screens or the sampling data of the print element is too much.

Hard Copy Function

The Hard Copy function is available only when the screen is a “General View Screen”. If HMI detects the “Print Typesetting” function is already set for the editing screen, the “Hard Copy” function will be ineffective.

Step1:

Set the Hard Copy Region in Screen Properties tab.



Step2:

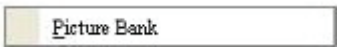
Enable the Print function.

Right clicking the mouse or use function key to create a “Report List” button on a “General View Screen”. Then, use this “Report List” button to enable the print function, just like “Print Typesetting” function.

Step 3:

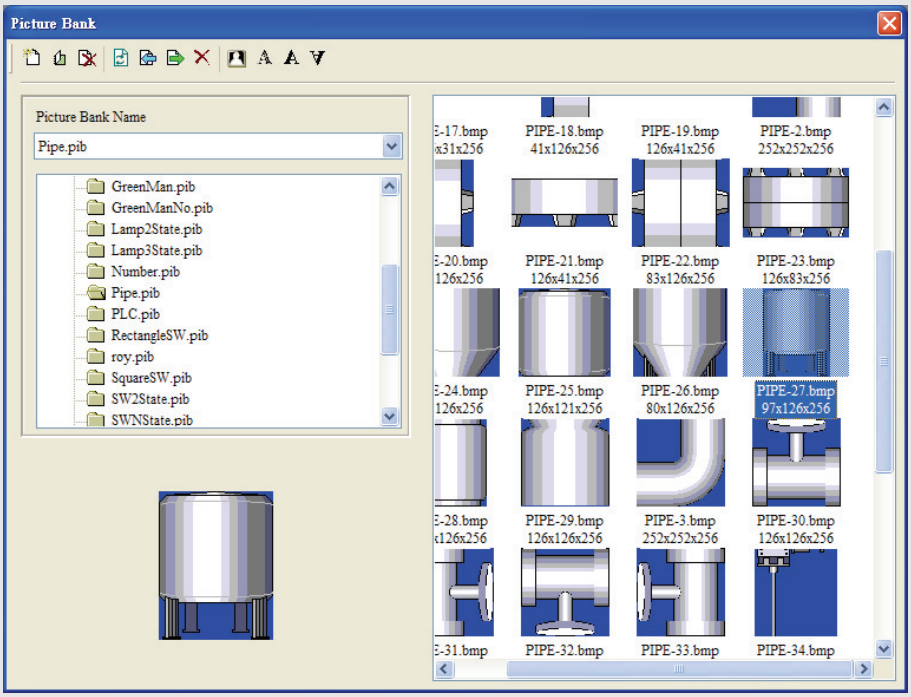
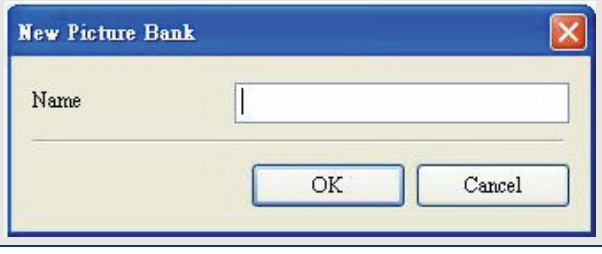
Connect to the printer and startup the HMI. When “Report List” button is pressed, the printer will start to print.

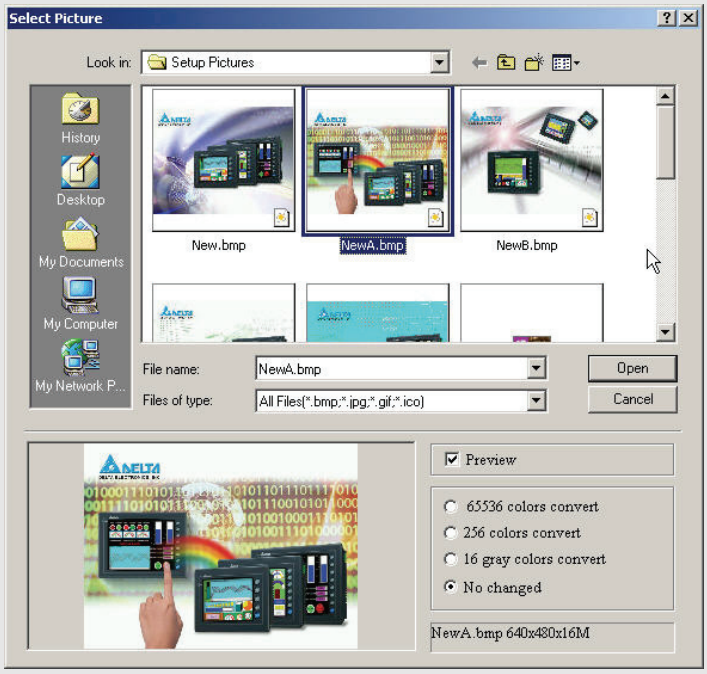
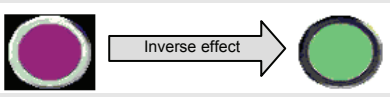
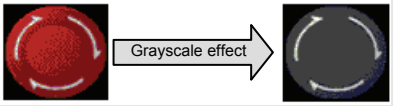
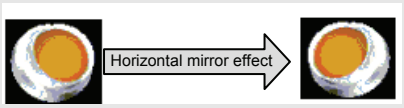
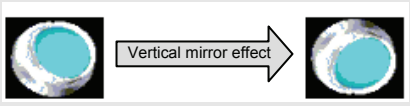
■ Picture Bank



The user can use this option to import various pictures to enrich the screen selection and make the Picture Bank more plentiful. Please Click **Options** > **Picture Bank** to execute this function.

Table 2.9.9 Picture Bank Settings

Picture Bank Browse Dialog Box	
 Click Picture Bank option to browse all pictures saved in Picture Bank. When one picture is selected, the user can see the picture in the preview window. Double left-clicking the mouse on the selected picture can display the picture in an actual size view.	
 New	Create a new picture bank. After clicking , the following New Picture Bank dialog box will display on the screen. 

Picture Bank Browse Dialog Box		
Install	Open a picture bank file (*.pib file).	
Uninstall	Uninstall the selected picture bank. The uninstall picture bank will be moved to Recycle Bin.	
Update	Save the modified picture into the picture bank. This button must be pressed after modifying picture; otherwise the modification will be lost and the modified picture will not be saved.	
Import	Import pictures into the designated picture bank. The formats of the pictures in the picture bank can be BMP, JPG, GIF(static) and ICON pictures. When selecting this function, the dialog box shown above will display. Then, the user can convert the picture color in advance to speed the compile time or choose “No changed” option to remain the original color. 	
Export	Export pictures in BMP format from the picture bank.	
Delete	Delete pictures in the picture bank.	
Inverse	Inverse the picture color. Negative effect.	
Grayscale	Convert the colorful picture to 256 grayscale color.	
Horizontal Mirror	Horizontal mirror effect.	
Vertical Mirror	Vertical mirror effect.	

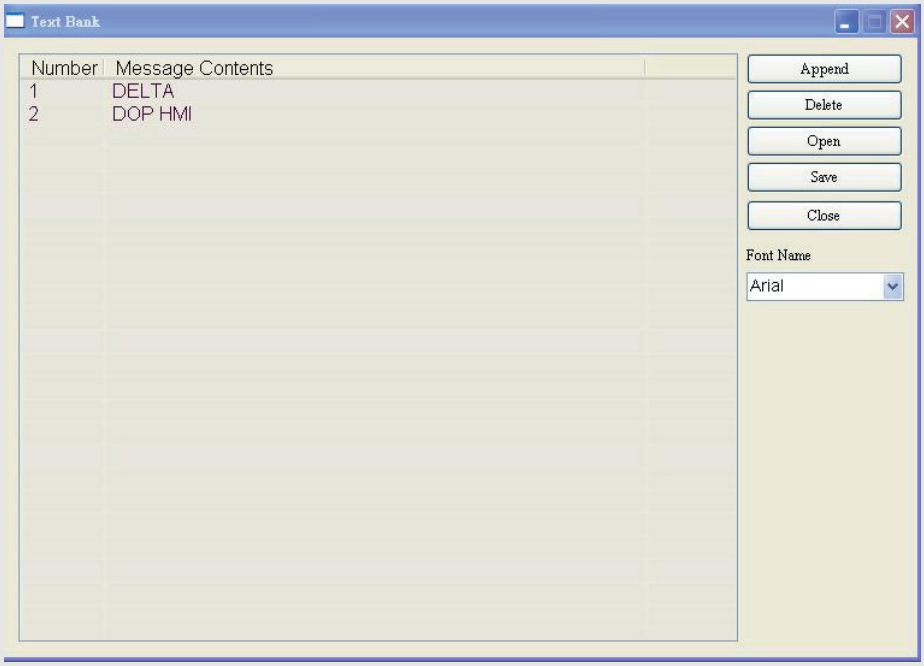
Picture Bank Browse Dialog Box	
Shortcut Menu	The user can right-click the mouse to display a shortcut menu shown in the figure below. This shortcut menu is a menu that shows a list of commands relevant to the picture bank option for the user to manage the pictures in the picture bank more quickly and efficiently. 

- **Text Bank**



Input common or frequently used text and terms into Text Bank. The user can select the text from the Text Bank and enter them on the element more easily and quickly if necessary.

Table 2.9.10 Text Bank Settings

Text Bank Dialog Box	
	
Append	Press Append button to add the text into Text Bank. The multi-language editing is supported in Text Bank option. The user can input the text or terms in different language and saved them in Text Bank. The multi-language font can also be set simultaneously.
Delete	Press Delete button to remove the input text or terms in Text Bank.
Open	Press Open button to open and import the text or terms into Text Bank.
Save	Press Save button to save and export the text file.

Text Bank Dialog Box	
Close	Close and exit the text bank dialog box.

- **Submarro**



Use this option to edit sub-macro and to be called by other Macros. For the Macro function, please refer to Chapter 4 for more details.

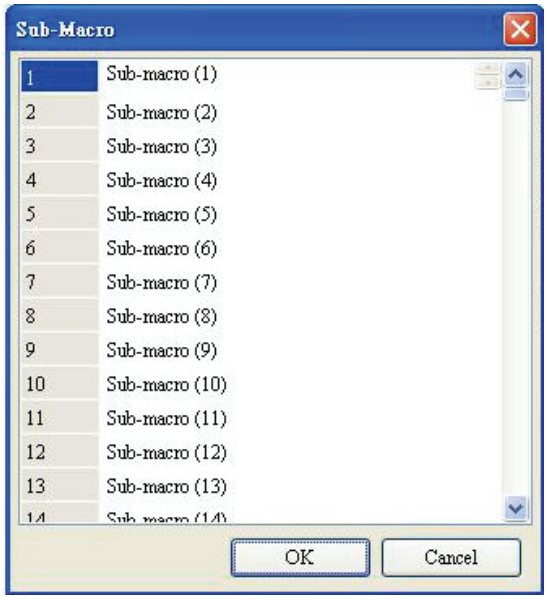


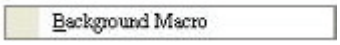
Fig. 2.9.3 Submarco dialog box

- **Initial Macro**



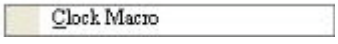
Use this option to edit initial macro. The initial macro will be executed automatically after the power is applied to HMI (power on). For the Macro function, please refer to Chapter 4 for more details.

- **Background Macro**



Use this option to edit background macro. For the Macro function, please refer to Chapter 4 for more details.

- **Clock Macro**



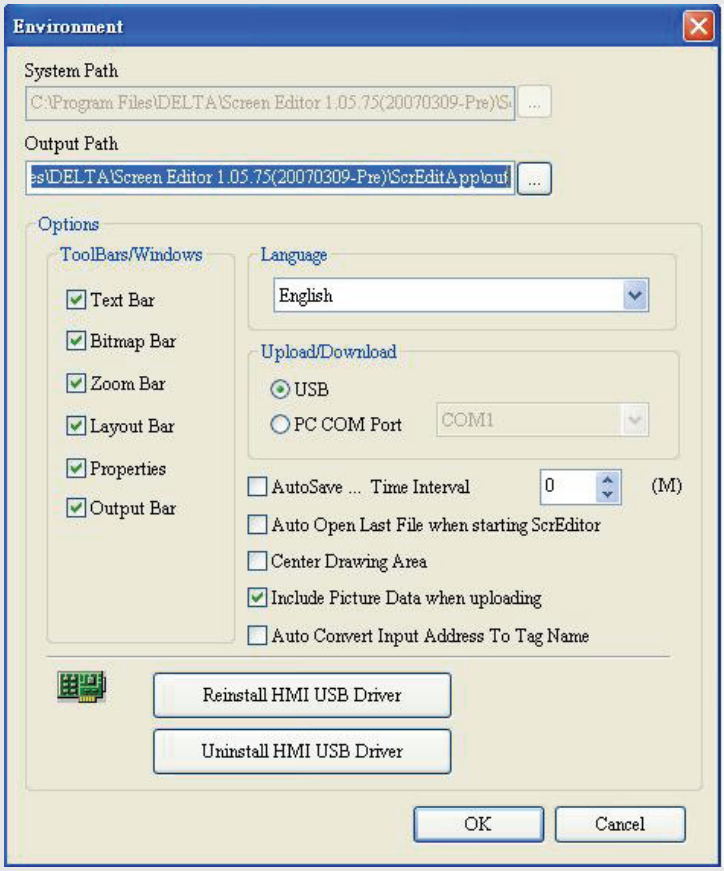
Use this option to edit clock macro. After HMI is turned on starting initial setup will run and the clock macro will be executed automatically by the clock setting time. For the Macro function, please refer to Chapter 4 for more details.

- **Environment**



Use this option to complete the environment settings of Screen Editor.

Table 2.9.11 Environment Settings

Environment Dialog Box		
		
System Path	This is used to set the location where ScrEdit will save the system files, including some system reference data and dynamic link library (*.dll) files. This option is set by system default and it cannot be changed.	
Output Path	This is used to set the location where ScrEdit will save the output file after compile operation. Some functions, such as on-line simulation, off-line simulation, file download and upload all refer to the files in this location. In order to avoid a system error and failure to find the file, we recommend the user not to change this setting if not necessary.	
Options	ToolBars/Windows	It is used to set if toolbars or ducking windows display or not display on the screen.
	Language	The user can choose **English**, **Traditional Chinese** and **Simplified Chinese** from the “Language” drop-down list.
	Upload/Download	It is used to determine the communication interface for upload and download. It can be USB or PC COM Port.
	Auto Saving… Time Interval	It is used to have ScrEdit automatically save the file every specified number of minutes. The unit is M(minute) and the setting range is within 0M ~ 120M.
	Auto Open for Next Execute Application	It is used to have ScrEdit automatically open the specified file every time the user executes ScrEdit.

Environment Dialog Box		
	Center Drawing Area	When this option is selected, the editing screen will be placed in the center position. 
	Include Picture Data when uploading	If this option is selected, all pictures will be uploaded when ScrEdit upload function is enabled. All uploaded pictures will be saved in a file named as "**_LOCALTEMP01.PIB**". The "Picture Bank Name" and the "Picture Name" (set in Property ducking window) of the editing elements will refer to and link to this file too. If ScrEdit ends the editing abnormally, the file name will be named as "**_LOCALTEMP02.PIB**, **_LOCALTEMP03.PIB** …", and vise versa when execute uploading next time. The last two numbers at the end of the file name will increase progressively.
	Auto Convert Input Address To Tag Name	For example, if the user wants to replace PLC address 1@Y0 with the word "OS", just define it in Tag Table option in advance. When this option is selected, ScrEdit will automatically convert input address 1@Y0 to the word "OS".
Driver	Reinstall HMI USB Drive: Press it to reinstall the HMI USB driver Uninstall HMI USB Drive: Press it to uninstall the HMI USB driver	
OK	Press OK button to save the modified settings and exit the Environment dialog box.	
Cancel	Press Cancel button exit the Environment dialog box without saving.	

2.10 Menu Bar and Toolbar (Window)

- **Window**

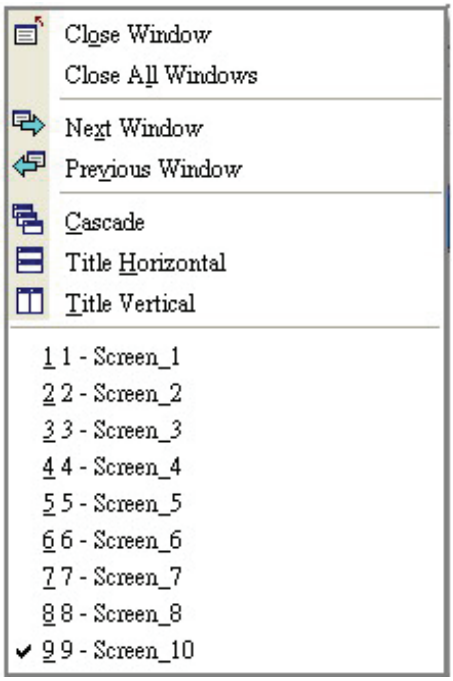


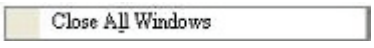
Fig. 2.10.1 Window options

- **Close Window**



It is used to hide the current window, NOT exit the current window. The users can execute this function by clicking **Window** > **Close Window**. If the user wants to display the hidden window, please click **Screen** > **Open Screen** to open an old screen.

- **Close All Windows**



It is used to hide all windows, NOT exit all windows. The user can execute this function by clicking **Window** > **Close All Windows**. If the user wants to display the hidden window, please click **Screen** > **Open Screen** to open old screens.

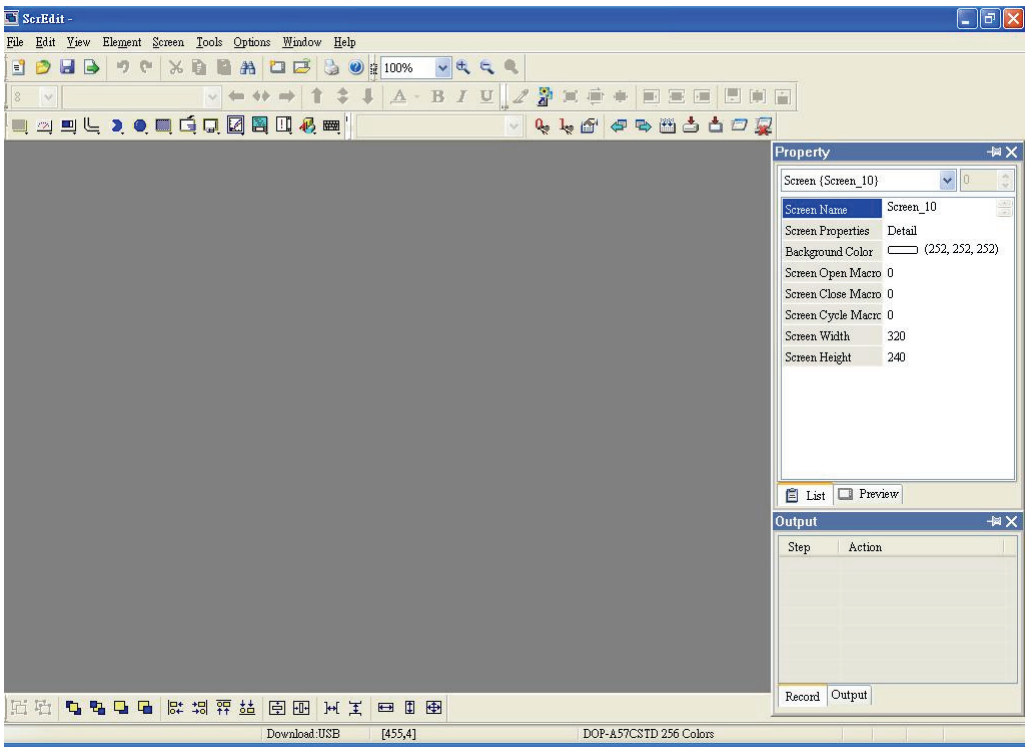
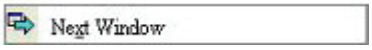


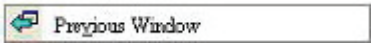
Fig. 2.10.2 Screen status after all windows are closed

■ Next Window



It is used to switch the current window to the next window. If the current window is the last window, the current window will not be changed even if this function is executed.

■ Previous Window



It is used to switch the current window to the previous window. If the current window is the first window, the current window will not be changed even if this function is executed.

■ Cascade



Cascade display. Display all editing windows so that they overlap. The title bar of each window is visible but only the top window is fully visible. The user can execute this function by clicking **Window** > **Cascade**. The opened windows are displayed in an overlapped pattern as shown as Fig. 2.10.3.

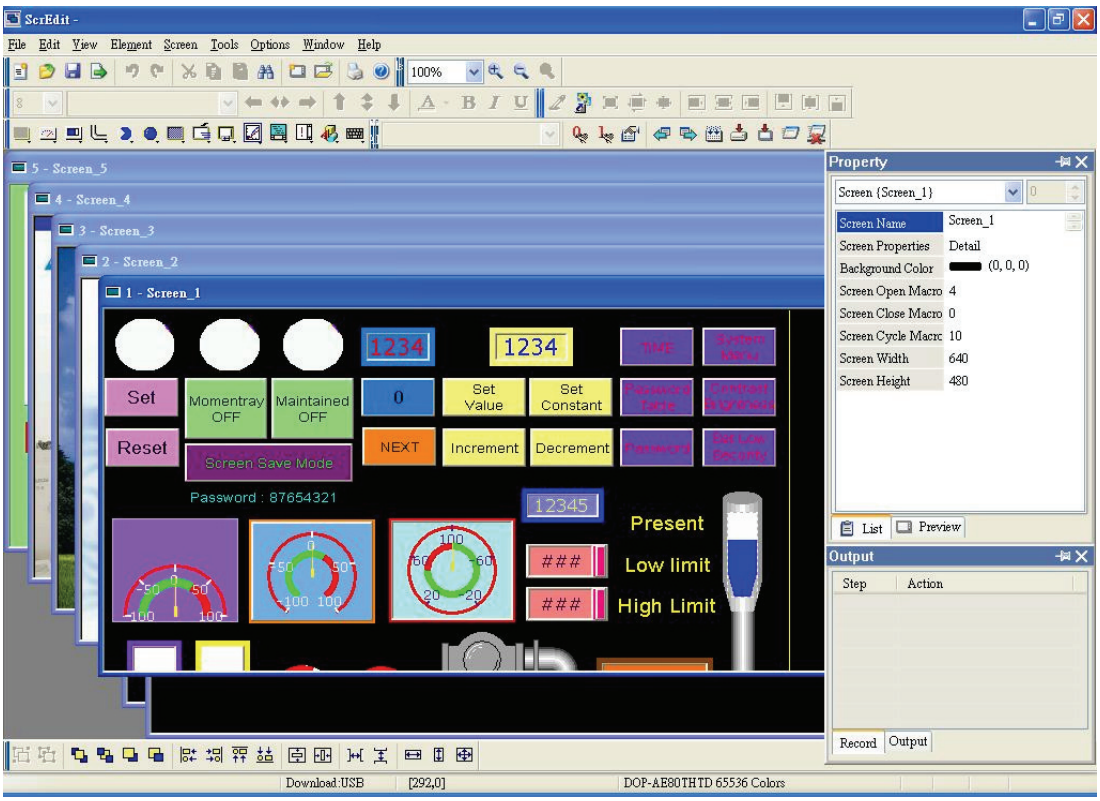
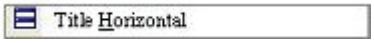


Fig. 2.10.3 Screen display after choosing Cascade command

■ Title Horizontal



Display all editing windows from top to bottom. The user can execute this function by clicking **Window > Title Horizontal**. The opened windows are displayed horizontally as shown as Fig. 2.10.4.

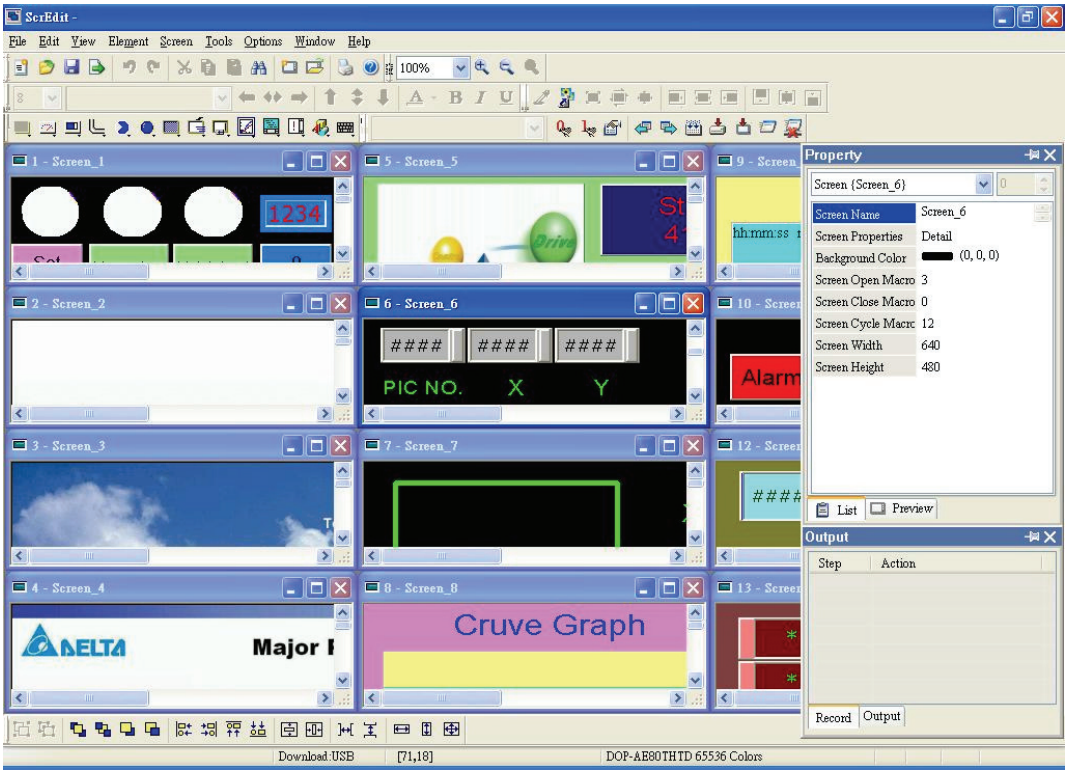


Fig. 2.10.4 Screen display after choosing Title Horizontal command

■ Title Vertical



Display all editing windows from left to right. The user can execute this function by clicking **Window** > **Title Vertical**. The opened windows are displayed vertically as shown as Fig. 2.10.5.

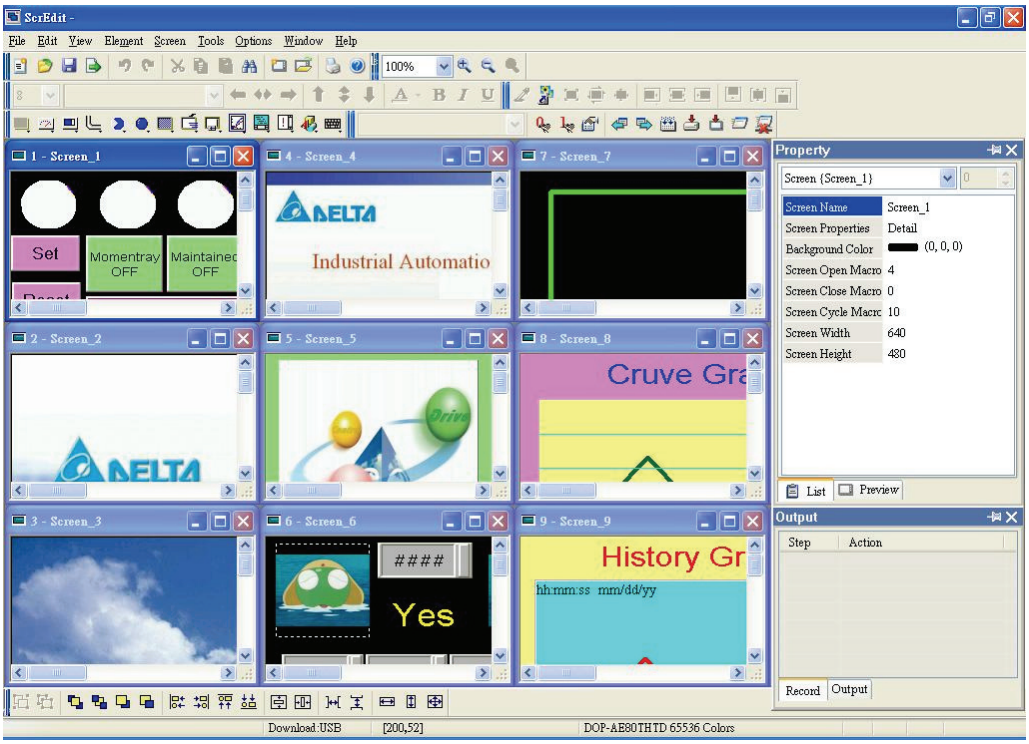


Fig. 2.10.5 Screen display after choosing Title Vertical command

■ Window Summary

ScrEdit shows a list of all opened screens at the bottom of “Window” pull-down menu for quick access. Just click the file name to open the file and view the screen directly.

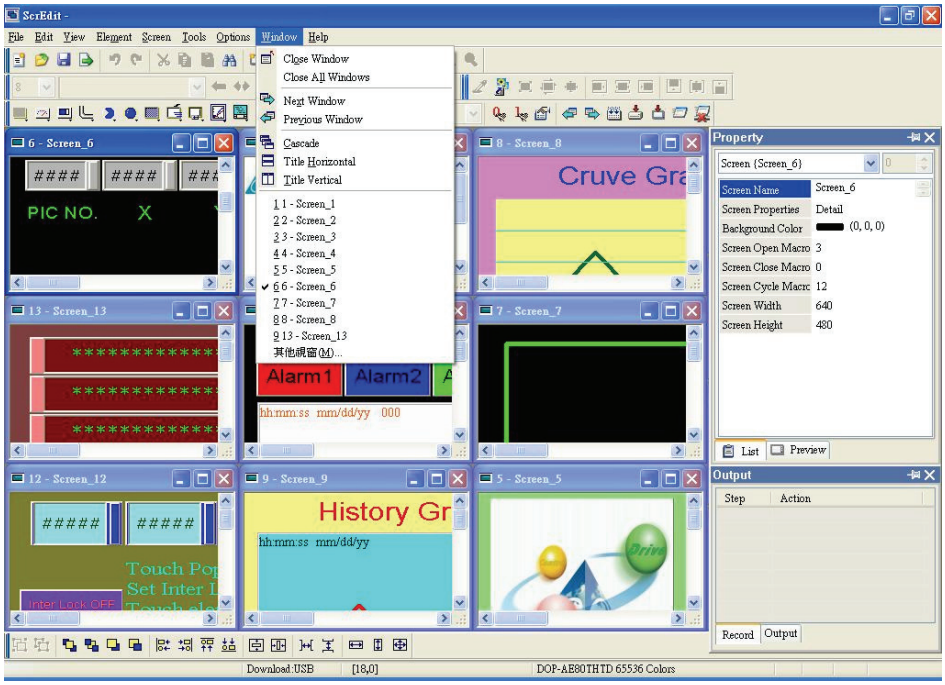


Fig. 2.10.6 Window Summary

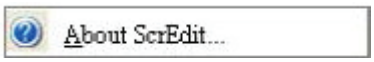
2.11 Menu Bar and Toolbar (Help)

- **Help**



Fig. 2.11.1 Help option

- **About ScrEdit**



Display the version information of Screen Editor and the firmware information of HMI.



Fig. 2.11.2 Screen Editor Version

Chapter 3 Element Function

In order to meet different applications and requirements, ScrEdit provides various elements for the user to use and design. Before using and designing these elements, please read this chapter first to understand how to choose an element and the special function of each element in ScrEdit.

3.1 How to Choose Element

There are three methods for choosing elements when editing the screens:

1. Right-click the mouse in the work place and a shortcut menu will display as Fig. 3.1.1. The user can choose the desired elements by the mouse.
2. Choose Element command from menu bar as Fig. 3.1.2.
3. Choose Element icon from toolbar as Fig. 3.1.3.

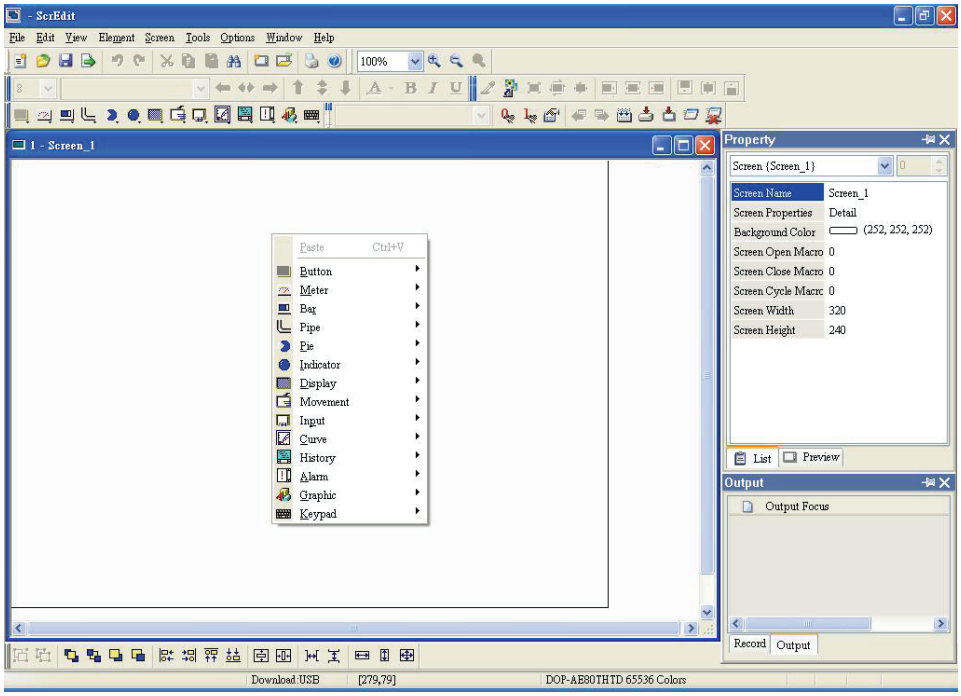


Fig. 3.1.1 Shortcut menu display

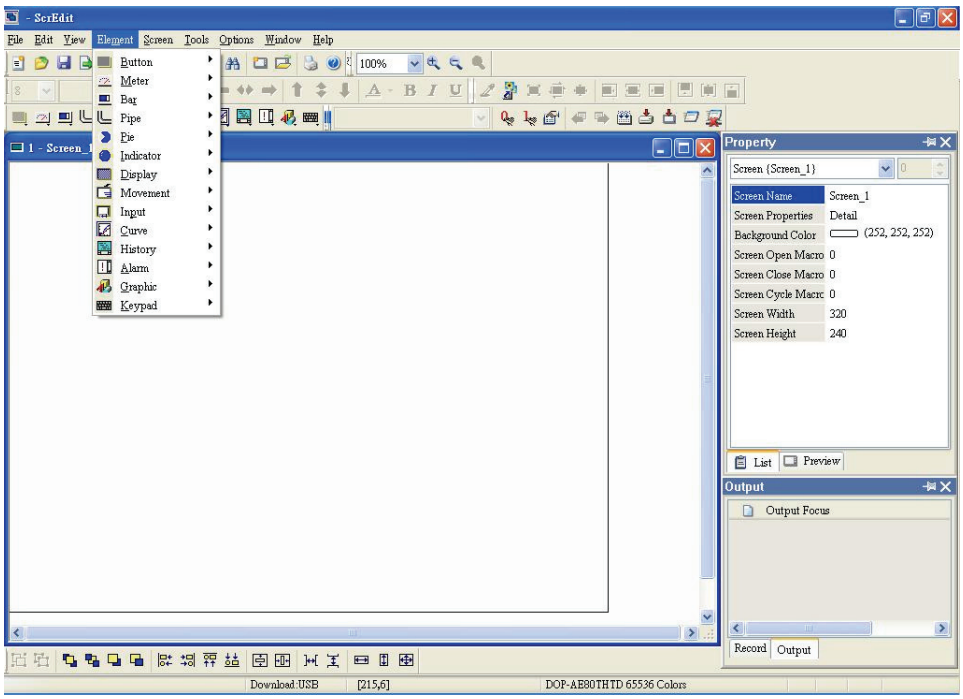


Fig. 3.1.2 Choosing Element command from menu bar

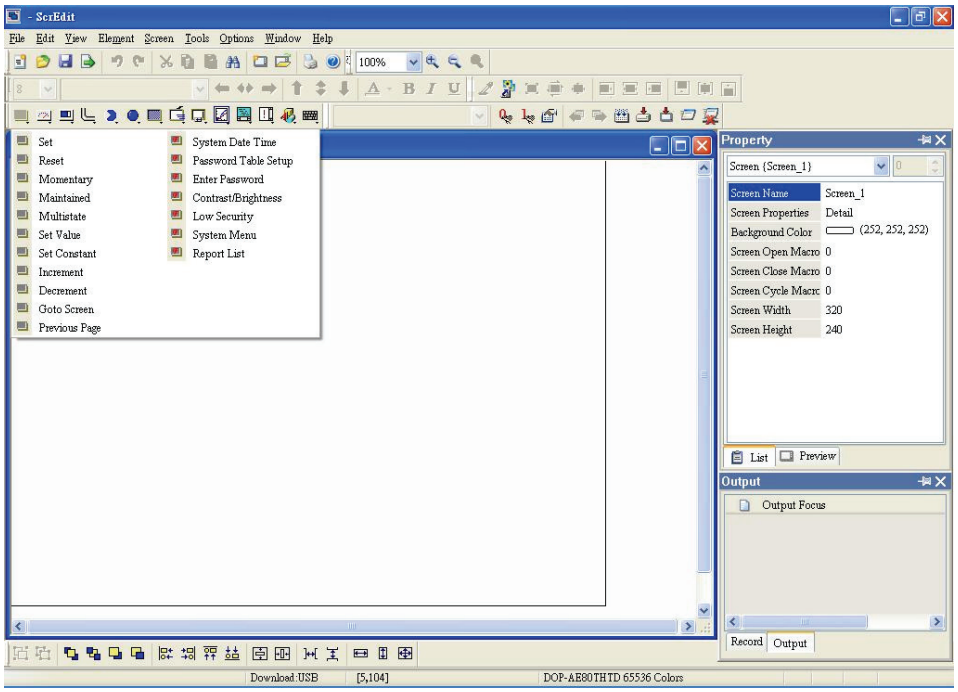


Fig. 3.1.3 Choosing Element icon from toolbar

After selecting an element, left-click and drag the mouse on work place, and then a new element is created.

3.2 Button Element



Fig. 3.2.1 Button element options

Table 3.2.1 Button elements

Button Type	Macro	Read	Write	Function
Set	ON	Yes	Yes	After pressing this button, the state of the setting address (Bit) will always be set to ON. If there is an ON Macro, it will be executed simultaneously.
Reset	OFF	Yes	Yes	After pressing this button, the state of the setting address (Bit) will always be set to OFF. If there is an OFF Macro, it will be executed simultaneously.
Maintained	ON OFF	Yes	Yes	After pressing this button, the state of the setting address (Bit) will be set to ON and be OFF when releasing the button. If there is an ON or OFF Macro, it will be executed simultaneously.
Momentary	ON OFF	Yes	Yes	After pressing this button, the state of the setting address (Bit) will be set to ON and execute ON Macro at the same time. When pressing the button again, the state of the setting address will be OFF and execute OFF Macro simultaneously.
Multistate	No	Yes	Yes	There are 1~256 user-defined multi-states for setting. The user can set the execution sequence to the next state or the previous state.
Set Value	No	No	Yes	After pressing this button, the “Numeric keypad” dialog box will pop up on HMI screen for the user to input the setting value directly. After inputting the setting value and pressing ENTER key, HMI will transmit the input value to the setting address.
Set Constant	No	No	Yes	After pressing this button, HMI will write the specific value into the setting address.
Increment	No	Yes	Yes	After pressing this button, HMI will add up the value contained within the setting address and the setting constant value, and store the addition result back into the setting address.
Decrement	No	Yes	Yes	After pressing this button, HMI will subtract the setting constant value from the value contained within the setting address, and store the subtraction result back to the setting address.
Goto Screen	No	No	No	After pressing this button, it will switch to the screen that the user designated.

Button Type	Macro	Read	Write	Function
Previous Page	No	No	No	After pressing this button, it will go back to the previous screen. For example, suppose that there are three screens, screen 1, screen 2 and screen 3. If the user has switched the screen from screen 1, screen 2 to screen 3 in order, when pressing “previous page” button on screen 3, HMI will switch to screen 2. When pressing “previous page” on screen 2 again, HMI will switch to screen 3.
Previous View	No	No	No	After pressing this button, it will go back to the previous view, just like Back command in **Windows® Explorer Browse**. For example, suppose that there are three screens, screen 1, screen 2 and screen 3. If the user has switched the screen from screen 1, screen 2 to screen 3 in order, when pressing “previous view” button on screen 3, HMI will switch to screen 2. When pressing “previous view” on screen 2 again, HMI will switch to screen 1.

■ General Buttons

After pressing these buttons, HMI will transmit ON/OFF signal to PLC or the controller. There are four types of buttons: Set button, Reset button, Momentary and Maintained buttons. Please refer to the following Table 3.2.2 for the property description of general buttons.

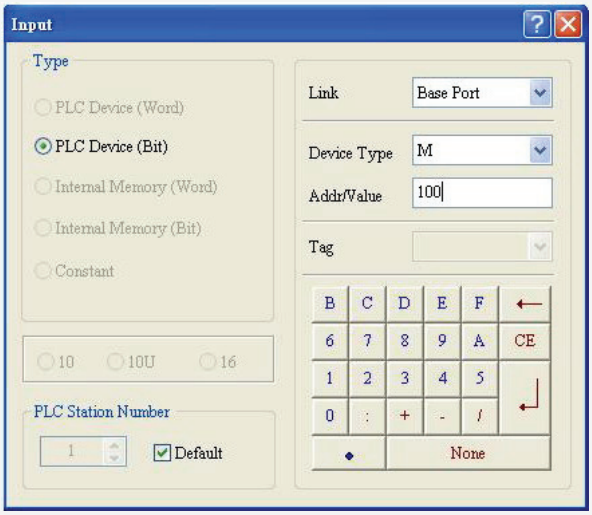
Table 3.2.2 Property description of general buttons

Property Description of General Buttons

Write Address
Read Address

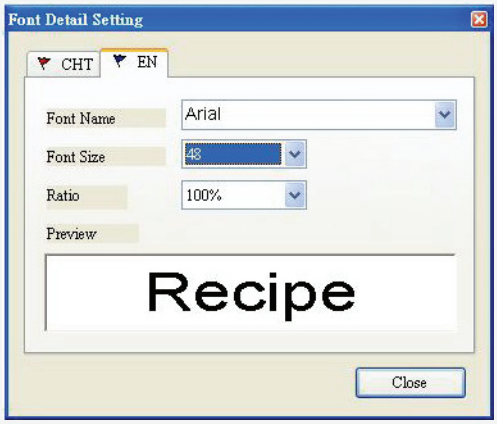
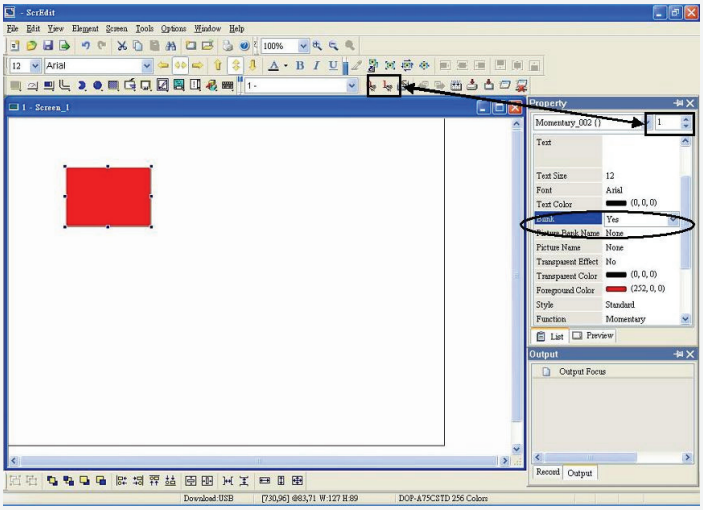
The address can be internal memory or the controller address. If only the write address is set, HMI will read the value of the write address automatically.

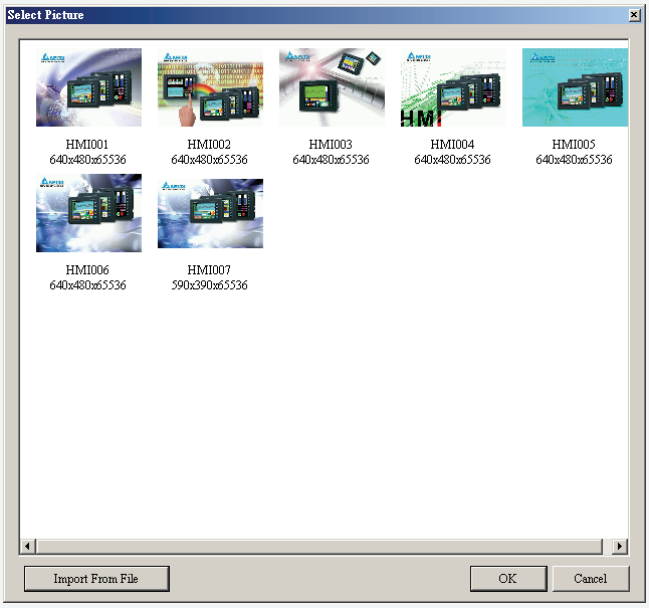
Pressing ... button next to the “Write Address” or “Read Address” you will enter into the following “Input” dialog box and select the write address or the read address.

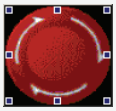
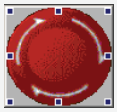


The link type can be Base Port (Controller) or Internal Memory. If the user is connecting to multi connections, the new connections will be added into the “Link” drop-down list. After selecting the Link option and Device Type, and correct address, press the Enter key, the corresponding numeric value will be recorded on the element that the user selected. Device types are described as follows:

$	Internal Memory (SDRAM)	**RCP**	Receipt register
$M	Non-volatile Internal Memory (SRAM)	**RCPNO**	Receipt Number Register

<table>
<tr><th colspan="5">Property Description of General Buttons</th></tr>
<tr><td rowspan="2"></td><td>*$</td><td>Indirect Address Memory (SDRAM)</td><td>RCPG</td><td>Receipt Group Number Register</td></tr>
<tr><td></td><td></td><td>Other</td><td>Other device name supported by other brands of controller. Please refer to DOP Series HMI Connection Manual.</td></tr>
<tr><td>Edit On/Off Macro</td><td colspan="4">Edit On and Off Macro. When pressing the button, the state of the button will be ON and the commands of ON Macro will be executed simultaneously. When pressing the button again, the state of the button will be changed to OFF and the commands of OFF Macro will be executed simultaneously. However, if the button is changed via macro or external signal, not by pressing the button, ON and OFF macro will not be executed at the same time. For the Macro function, please refer to Chapter 4 for more details.</td></tr>
<tr><td>Text
Text Size
Font
Text Color</td><td colspan="4">The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element. When the user presses  button next to “Font”, the following “Font Detail Setting” dialog box will display.

In “Font Detail Setting” dialog box, the user can select Font Name, Font Size and Ratio of the text and view the text format from the Preview window in advance. If the multi-language function is used, the user can see different language tabs and edit different language font setting in “Font Detail Setting” dialog box. Please refer to the example figure above.</td></tr>
<tr><td>Twinkle</td><td colspan="4">The element can twinkle to remind the user.
The user can decide if the element twinkles or not when the button is set to be ON or OFF state. The twinkling color is the relative color of the button’s state. For the method for switching ON or OFF state of the button, please refer to the figure shown below.
</td></tr>
</table>

<table>
<tr><th colspan="3">Property Description of General Buttons</th></tr>
<tr><td>Picture Bank Name
Picture Name</td><td colspan="2">The user can determine the picture of the element by clicking “Picture Bank Name”. (If “Picture Bank Name” has been selected, the user can click “Picture Name” to determine the picture of the element). The following dialog box will display when the user selects the existing Picture Bank Name from the drop-down list.


In this dialog box, the user can double click the mouse to select an element. The user can also press Shift and left key of the mouse to import several pictures into the designated element at the same time. The selected pictures will be stored in each state of the element in order. If the number of the selected pictures is more than the number of the element state, only the pictures to the number of the element state will be imported and the remainder will be ignored and not be imported into the element.
<table>
<tr><td>Import From File</td><td>Press this button to import the pictures directly. The user does not need to exit the dialog box and click “Option” > “Picture Bank” command again.</td></tr>
</table></td></tr>
<tr><td>Transparent Effect
Transparent Color</td><td colspan="2">Use the removal tool  to remove the color of the element and determine the transparent color of the element.
The user can click the removal tool  on toolbar or choose the transparent color by using the drop-down list. However, if the selected transparent color is too close to the element color itself, it will make no difference to the element. For example, RGB(0,0,0) is black color, but RGB(1,1,1) is also black color. When the element color is RGB(0,1,0) (it is also black color visually), even if the user selects RGB(0,0,0) as the transparent color, the element will look almost the same still.
At this time, we recommend the user use the removal tool  on toolbar and remove the color of the element directly.
Please ensure to check whether the color of the selected element matches the color supported by HMI or not. This function is invalid and the color may not be removed successfully if the user applies this function on a 65536 colors element in a 256 colors editing environment.
The effect on the element before and after this action happens is shown as the figures below.
<table>
<tr><td>The effect before this action happens</td><td>The effect after this action happens</td></tr>
<tr><td></td><td></td></tr>
</table></td></tr>
</table>

Property Description of General Buttons				
Foreground Color Style	Standard	Raised	Round	Invisible
				
	The user can specify the button style and foreground color as the figures above by using this option.			
Function	The user can modify the element characteristic directly without re-create a new element. The elements that their characteristics can be modified directly by using this option are: **Set** button, **Reset** button, **Momentary** button and **Maintained** button these four kinds of buttons.			
Push Time (second)	Use this option to set the active time of the button. When this option is set, the button will be active after pressing the button longer than the setting time. Using this option can avoid malfunction. The range is within 0 ~ 10 seconds.			
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.			
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).			
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of “InterLock Level”), this button can be enabled.			
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.			
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.			

Example of Button Elements:

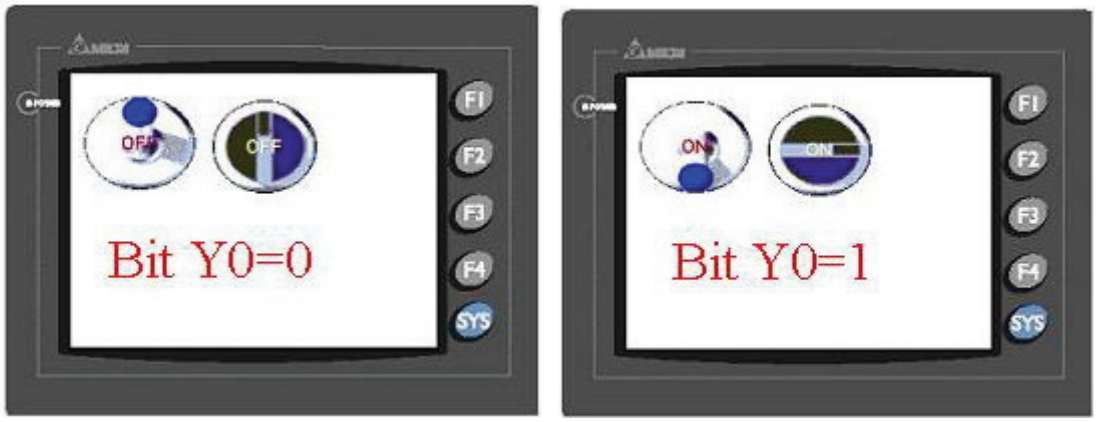


Fig. 3.2.2 Example of Button elements

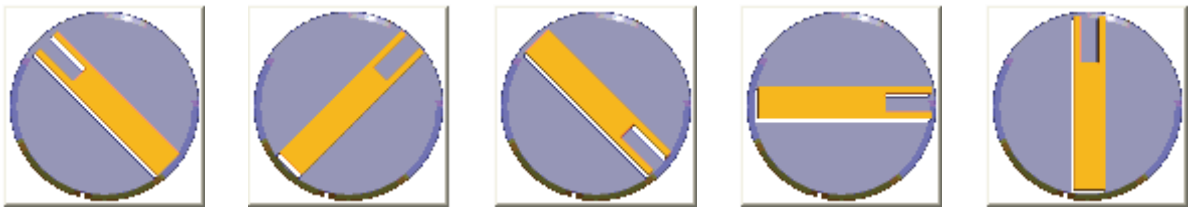
■ Multistate Buttons

Table 3.2.3 Property description of Multi-state buttons

Property Description of Multistate Buttons		
Multistate buttons accept three kinds units, WORD, LSB and Bit and the state number will be different by the unit. There are 1-256 states if its unit is WORD, 16 states if its unit is LSB and 2 states if its unit is Bit. The unit of memory address will be different by the value unit. If the value unit is WORD or LSB, the unit of memory address will be WORD. If the value unit is Bit, the unit of memory address will be Bit. If it is needed to add or delete the total state numbers, only add or delete the state numbers in element property table.		
Write Address Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Twinkle	The element can twinkle to remind the user. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Picture Bank Name Picture Name	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Transparent Effect Transparent Color	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Foreground Color Style	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Push Time (second)	Use this option to set the active time of the button. When this option is set, the button will be active after pressing the button longer than the setting time. Using this option can avoid malfunction. The range is within 0 ~ 10 seconds.	
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.	
Data Length	Bit	Multistate button can have two states.
	Word	Multistate button can have 256 states.
	LSB	Multistate button can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Add/Remove State	It is used to set the state number of multistate button. There are 1-256 states can be set if its unit is WORD, 16 states can be set if its unit is LSB and 2 states can be set if its unit is Bit.	
Sequence	It is used to switch the sequence of multistate state (previous state/next state).	
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).	
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of “InterLock Level”), this button can be enabled.	
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. (Please refer to Table 3.2.2 Property Description of General Buttons.)	

Example of Multistate Buttons:

When the data length is LSB (D100.0 ~ D100.4):

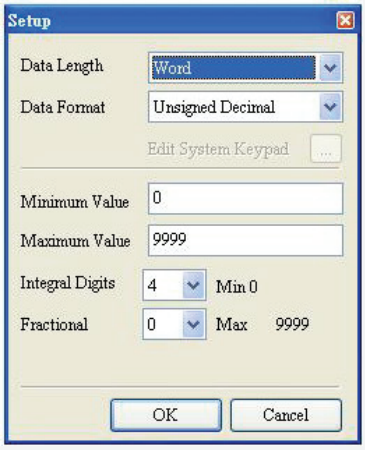


S0=D100.0 ON S1=D100.1 ON S2=D100.2 ON S3=D100.3 ON S4=D100.4 ON

Fig. 3.2.3 Multi-state buttons display

■ Set Value Button

Table 3.2.4 Property description of Set Value buttons

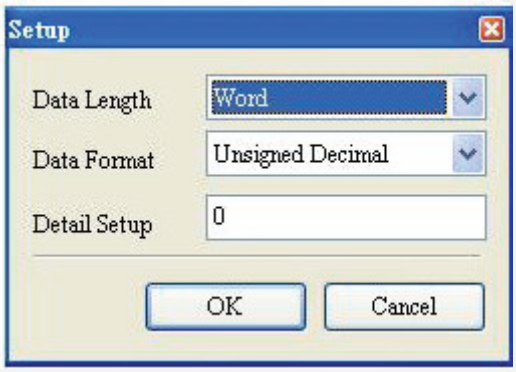
Property Description of Set Value Buttons	
After pressing this button on the screen, a system built-in numeric keypad (TEN-KEY) will show up and the user can use it to input the setting value directly. When pressing ENTER key, HMI will send the input setting value to PLC corresponding register. The maximum and minimum input setting values are all user-defined. The user can also specify the trigger mode to trigger the designated PLC address before or after writing the setting value.	
Write Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)
Picture Bank Name Picture Name	(Please refer to Table 3.2.2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3.2.2 Property Description of General Buttons.)
Foreground Color Style	(Please refer to Table 3.2.2 Property Description of General Buttons.)
Trigger Trigger Mode	The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.
Detail Range Setup	

<table>
<tr><th colspan="4">Property Description of Set Value Buttons</th></tr>
<tr><td rowspan="5"></td><td>Data Length</td><td colspan="2">There are 16bits Word and 32bits Double Word two options.
Minimum/Maximum:
The user can set the minimum and maximum of input setting value to determine the range of input setting value.</td></tr>
<tr><td rowspan="2">Data Format</td><td colspan="2">It provides different kinds of data format for different data length:</td></tr>
<tr><td>Word</td><td>Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary</td><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary
7. Floating</td></tr>
<tr><td>Integral Digits
Fractional</td><td colspan="2">Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as “Floating”.</td></tr>
<tr><td colspan="3">When the user has input the minimum and maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length, data format, integral and fractional digits.</td></tr>
<tr><td>User Security Level</td><td colspan="3">Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.</td></tr>
<tr><td>Set Low Security</td><td colspan="3">Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).</td></tr>
<tr><td>InterLock Address
InterLock Level</td><td colspan="3">When InterLock Address is set to be ON or OFF (this is determined by the property of “InterLock Level”), this button can be enabled.</td></tr>
<tr><td>Before Execute Macro</td><td colspan="3">If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.</td></tr>
<tr><td>After Execute Macro</td><td colspan="3">If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.</td></tr>
</table>

■ Set Constant Button

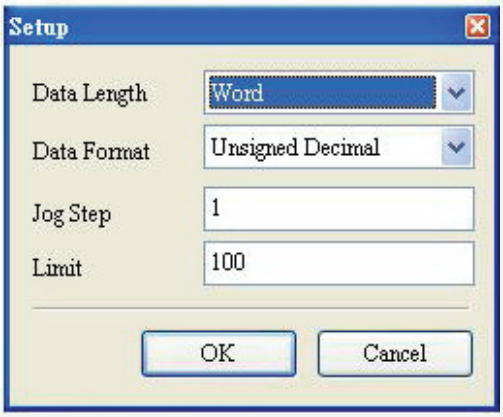
Table 3.2.5 Property description of Set Constant buttons

Property Description of Set Constant Buttons	
After pressing this button on the screen, HMI will send the specified constant value to PLC corresponding register. It has the same function as Set Value button. The user can also specify the trigger mode to trigger the designated PLC address before or after writing the setting value.	
Write Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color that provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)

<table>
<tr><th colspan="3">Property Description of Set Constant Buttons</th></tr>
<tr><td>Picture Bank Name
Picture Name</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Transparent Effect
Transparent Color</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Foreground Color
Style</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Trigger
Trigger Mode</td><td colspan="2">The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.</td></tr>
<tr><td>Detail Range Setup</td><td colspan="2">
</td></tr>
<tr><td></td><td>Data Length</td><td>There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td></td><td rowspan="3">Data Format</td><td>There are following data format provided:</td></tr>
<tr><td>Word/Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td></td><td>Value</td><td>It is used to enter the constant value that the user wants to write. After pressing OK button, HMI will examine the value by referring to the selected data length and data format.</td></tr>
<tr><td>User Security Level</td><td colspan="2">Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.</td></tr>
<tr><td>Set Low Security</td><td colspan="2">Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).</td></tr>
<tr><td>InterLock Address
InterLock Level</td><td colspan="2">When InterLock Address is set to be ON or OFF (this is determined by the property of “InterLock Level”), this button can be enabled.</td></tr>
<tr><td>Before Execute Macro</td><td colspan="2">If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.</td></tr>
<tr><td>After Execute Macro</td><td colspan="2">If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.</td></tr>
</table>

■ Increment / Decrement

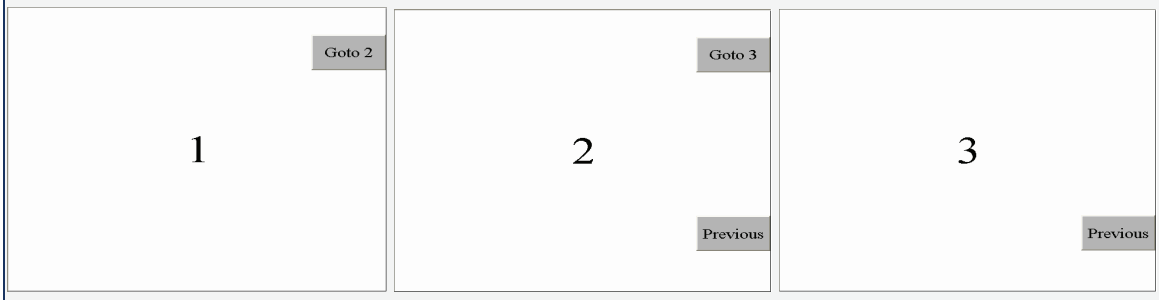
Table 3.2.6 Property description of Increment / Decrement buttons

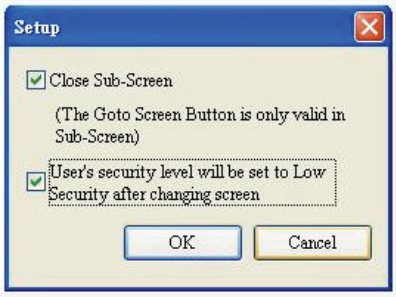
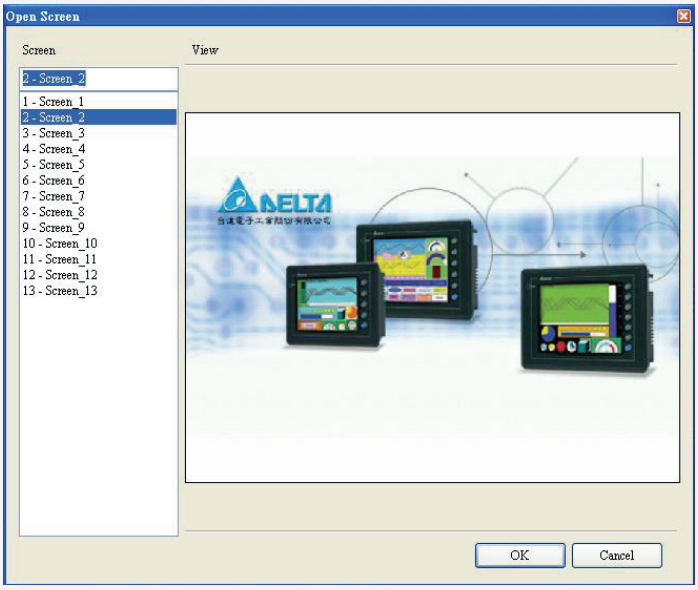
<table>
<tr><th colspan="3">Property Description of Increment / Decrement Buttons</th></tr>
<tr><td colspan="3">After pressing this button on the screen, HMI will read the value from PLC (Controller) and add or subtract the set constant value. Then, write the result into PLC (Controller) corresponding register. If the addition or subtraction result exceeds the limit (minimum and maximum) set in HMI, HMI will save the limit value (minimum and maximum) into the PLC (Controller) corresponding address.</td></tr>
<tr><td>Write Address
Read Address</td><td colspan="2">The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Text / Text Size
Font / Text Color</td><td colspan="2">The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Picture Bank Name
Picture Name</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Transparent Effect
Transparent Color</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Foreground Color
Style</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Function</td><td colspan="2">The user can modify the element characteristic directly without re-create a new element. The elements that their characteristics can be modified directly by using this option are: Increment button and Decrement button.</td></tr>
<tr><td>Trigger
Trigger Mode</td><td colspan="2">The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.</td></tr>
<tr><td rowspan="5">Detail Range Setup</td><td colspan="2">
</td></tr>
<tr><td>Data Length</td><td>There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td rowspan="3">Data Format</td><td>There are following data format provided:</td></tr>
<tr><td>Word/Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td>Jog Step</td><td>It is used to set the increasing and decreasing value when pressing the Increment and Decrement button every time.</td></tr>
</table>

Property Description of Increment / Decrement Buttons		
	Limit	It is used to set the limit of the increment and decrement value. After pressing OK button, HMI will examine the input increment & decrement value and limit value also by referring to the selected data length and data format.
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.	
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).	
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of “InterLock Level”), this button can be enabled.	
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.	
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.	

- **Goto Screen / Previous Page / Previous View Buttons**

Table 3.2.7 Property description of Goto Screen / Previous Page (Previous View) buttons

Property Description of Goto Screen / Previous Page / Previous View Buttons	
There are three kinds of selection for switching screens: 1. Goto screen: press this button on the screen and HMI can go to a specific screen. 2. Previous page: press this button on the screen and HMI can switch to the previous screen. 3. Previous view: press this button on the screen and HMI can switch to previous view, just like Back command in **Windows® Explorer Browse**.	
	
The above example screens describe the operation of “previous view” button. In screen 1, if press “Goto 2” button, HMI will switch to the screen 2. If press “Goto 3” button on screen 2, HMI will switch to screen 3. Then, if press “previous view” button on screen 3, HMI will return to screen 2. If press “previous page” button on screen 2, HMI will switch to screen 1. However, if the function of the button created on screen 2 is “previous page”, not “previous view”, when press “previous page” button on screen 2, HMI will switch to screen 3, not screen 1 and this is just the difference between “Previous page” and “Previous view”.	
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color that provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)
Picture Bank Name Picture Name	(Please refer to Table 3.2.2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3.2.2 Property Description of General Buttons.)

<table>
<tr><th colspan="3">Property Description of Goto Screen / Previous Page / Previous View Buttons</th></tr>
<tr><td>Foreground Color
Style</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Function</td><td colspan="2">The user can modify the element characteristic directly without re-create a new element. The elements that their characteristics can be modified directly by using this option are: Goto button, Previous page and Previous view buttons.</td></tr>
<tr><td>Trigger
Trigger Mode</td><td colspan="2">The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.</td></tr>
<tr><td>Detail</td><td colspan="2">This dialog box will pop up only when the button function is “Goto screen”.

</td></tr>
<tr><td></td><td>Close Sub-Screen</td><td>When this option is selected, it indicates that this Goto screen button is only valid in Sub-Screen. When pressing this button, the current (active) sub screen will be closed.</td></tr>
<tr><td></td><td>User’s security level will be set to Low Security after changing screen.</td><td>When this option is selected, it will force the current user’s priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).</td></tr>
<tr><td>User Security Level</td><td colspan="2">Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.</td></tr>
<tr><td>Goto Screen</td><td colspan="2">When clicking this option, the following dialog box will pop up:


In this “Open Screen” dialog box, the user can select the desired screen from left side and the preview screen will display on the right side. After selecting the screen and pressing OK button, HMI will record the designated screen to this Goto button element.</td></tr>
</table>

Property Description of Goto Screen / Previous Page / Previous View Buttons	
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of “InterLock Level”), this button can be enabled.
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.

- **System Function Button**



Fig. 3.2.5 System function button options

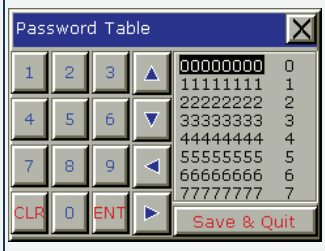
Table 3.2.8 System function buttons

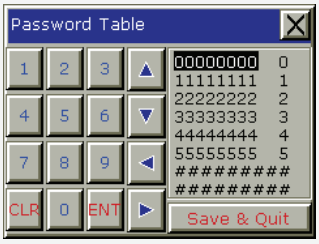
Button Type	Macro	Read	Write	Function
System Date Time	No	No	No	It is used to set HMI system time and date (year-month-day, hours:minutes:seconds)
Password Table Setup	No	No	No	It is used to set all password priority.
Enter Password	No	No	No	HMI provides passwords function.
Contrast Brightness	No	No	No	It is used to adjust HMI contrast and brightness.
Low Security	No	No	No	After pressing this button, HMI will set the current priority to be the lowest level (the lowest level is 0).
System Menu	No	No	No	After pressing this button, HMI will change screen to system menu.
Report List	No	No	No	After pressing this button, HMI will output the screen data to the specific device. It is usually used with print function.

For the property description of system function buttons, please refer to the following Table 3.2.9:

Table 3.2.9 System function buttons

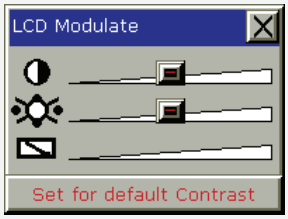
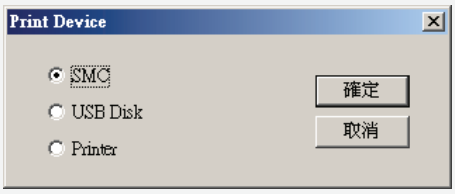
<table>
<tr><th colspan="3">Property Description of System Function Buttons</th></tr>
<tr><td>Text / Text Size
Font / Text Color</td><td colspan="2">The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Picture Bank Name
Picture Name</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Transparent Effect
Transparent Color</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Foreground Color
Style</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Function</td><td colspan="2">The user can modify the element characteristic directly without re-create a new element. The elements that their characteristics can be modified directly by using this option are the following items:</td></tr>
<tr><td></td><td>System Date & Time</td><td>Use this option to set the system date and time of HMI. The user only need to press SYS button on HMI panel to enter HMI system setting screen and edit the date & time as the figure below.

</td></tr>
<tr><td></td><td>Password Table Setup</td><td>After selecting this option, determine the open level according to the User Security Level in property table. After downloading screen data to HMI, if the user security level is lower than the setting level, this “Password Table” will not be opened and only the “Password Keypad” dialog box will display. Password Table can be opened or not depends on whether the user security is higher than the setting level or not. Even though the user can open Password Table, it only indicates that the user can change the password that level is lower than the users’. The user still cannot change or view those passwords that are higher than the users’. Please refer to the figures below.


Maximum Priority


Password 5 Levels</td></tr>
<tr><td></td><td>Enter Password</td><td>This button provides HMI a password input interface. It will open the corresponding priority by the input password. The higher level the user inputs, the higher priority the user has. Please refer to the figure at right.

</td></tr>
</table>

<table>
<tr><th colspan="4">Property Description of System Function Buttons</th></tr>
<tr><td rowspan="4"></td><td>Contrast
Brightness</td><td>This button allows the user to adjust HMI LCD contrast and brightness settings. After pressing this button, the user will get the following pop-up window to adjust HMI LCD contrast and brightness settings. If the user presses “Set for default Contrast” button, it will set HMI LCD to the default settings.</td><td>
</td></tr>
<tr><td>Low Security</td><td colspan="2">Using this button can set the user priority to the lowest (Level 0). This option makes the user priority level become the lowest to protect control system parameter not to be modified when the user exits the different screens. It can also avoid the misoperation that may cause system error. (This function is also provided for Goto screen button.)</td></tr>
<tr><td>System Menu</td><td colspan="2">After pressing this button, HMI will be back to system menu screen. The user can return to operation screen just by activating “Run” function or startup HMI again.</td></tr>
<tr><td>Report List</td><td colspan="2">This button has many functions. It can be used flexibly depending on the properties of the “Report List” option (Please refer to page 2-124 in Chapter 2 and the following description of Report Device).</td></tr>
<tr><td>Trigger
Trigger Mode</td><td colspan="3">The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.</td></tr>
<tr><td rowspan="4">Report Device</td><td colspan="3">This option is provided in Report List button only. When the user selects a Report List button, the user can set this option in the property table.


The Report Device window is shown as the figure above. The Report Device can be SMC, USB flash drive, and Printer. Please note that USB flash drive and Printer are provided in DOP-AE and DOP-AS series HMI only.</td></tr>
<tr><td>SMC</td><td colspan="2">Output the history records and alarm data to SMC card.</td></tr>
<tr><td>USB Flash Drive</td><td colspan="2">Output the history records and alarm data to USB flash drive.</td></tr>
<tr><td>Printer</td><td colspan="2">HMI will check if Print Typesetting function is set or not first. If Print Typesetting function is set already, the screen data will be output to the printer directly. If HMI detects the Print Typesetting function is not set yet, the Hard Copy function will be enabled.</td></tr>
<tr><td>User Security Level</td><td colspan="3">Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.</td></tr>
<tr><td>InterLock Address
InterLock Level</td><td colspan="3">When InterLock Address is set to be ON or OFF (this is determined by the property of “InterLock Level”), this button can be enabled.</td></tr>
<tr><td>Before Execute Macro</td><td colspan="3">If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.</td></tr>
</table>

Property Description of System Function Buttons	
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.

3.3 Meter Element

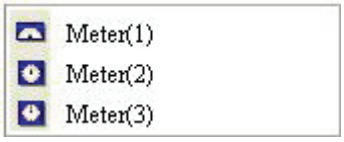
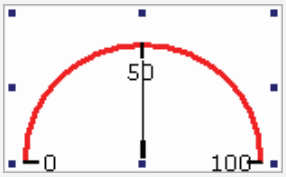
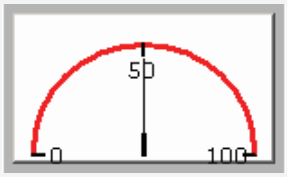
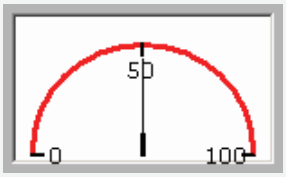
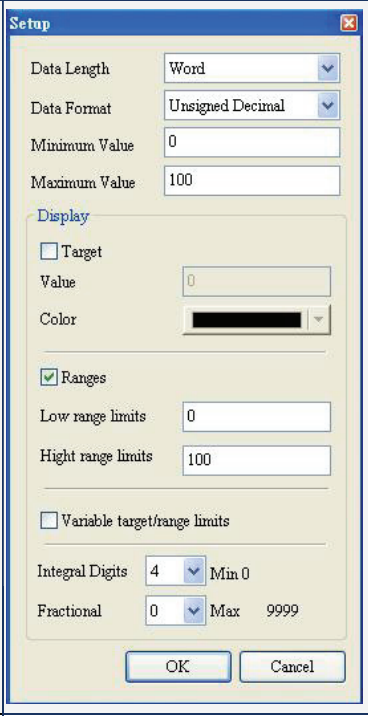
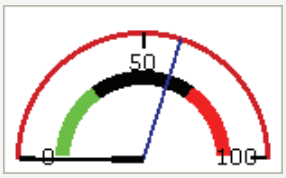
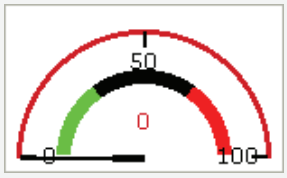


Fig. 3.3.1 Meter element options

Table 3.3.1 Property Description of Meter Element

<table>
<tr><th colspan="5">Property Description of Meter Element</th></tr>
<tr><td colspan="5">The user can set meter appearance in the property table, such as the style, the color (including border color, background color, stitch color, scale color) and the scale region number, etc. Also, the max. & min. value and high & low limit can be defined in Detail Setup dialog box. It can be used to calculate the specified address and measure if it exceeds the limit or not. The user can also use various colors to show clearly and this is convenience for the user to recognize.</td></tr>
<tr><td>Read Address</td><td colspan="4">The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Text / Text Size
Font / Text Color</td><td colspan="4">The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Border Color</td><td colspan="4">It is used to set the border color of meter element.</td></tr>
<tr><td>Background Color</td><td colspan="4">It is used to set the background color of meter element.</td></tr>
<tr><td rowspan="2">Style</td><td>Standard</td><td>Raised</td><td colspan="2">Sunken</td></tr>
<tr><td>
</td><td>
</td><td colspan="2">
</td></tr>
<tr><td>Detail Setup</td><td>
</td><td>Data Length</td><td colspan="2">There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td></td><td></td><td>Data Format</td><td colspan="2">There are following data format provided:
Word/Double Word
1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal</td></tr>
<tr><td></td><td></td><td>Minimum Value</td><td colspan="2" rowspan="2">It is used to set the display minimum and maximum value.</td></tr>
<tr><td></td><td></td><td>Maximum Value</td></tr>
</table>

Property Description of Meter Element		
	Target Value Color	The user can decide if the target value display or not by using this option. If this option is set, the target value and its color set by the user will display just like the figure shown below: (Here we set the target value is 60 and its color is in blue.) 
	Ranges (Enable range setting)	Please refer to the description of Low & High Region Color.
	Variable target/range limits	When the target value and low & high limit is a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.
	Integral Digits	Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format.
	Fractional Digits	
	When the user has input the target value, minimum and maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length, data format, integral and fractional digits.	
Low Region Color High Region Color	This option is available and displayed in the property table only when the “Ranges” option in the Detail Setup dialog box is selected. If the user sets the low limit value is 30 and the color of low limit region is in green, and then set the high limit value is 70 and the color of high limit region is in red, the meter element will be shown as the figure below: 	
Stitch Color	It is used to set the stitch color of the meter element.	
Scale Color	It is used to set the scale color of the meter element.	
Scale Region Number	It is used to set the scale region number of the meter element. The user can use the up or down buttons to increase or decrease the scale region number. The setting rang is within 1 ~ 10.	

3.4 Bar Element

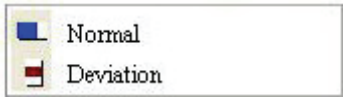
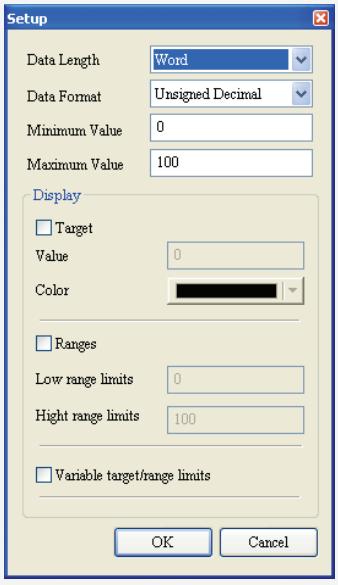


Fig. 3.4.1 Bar element options

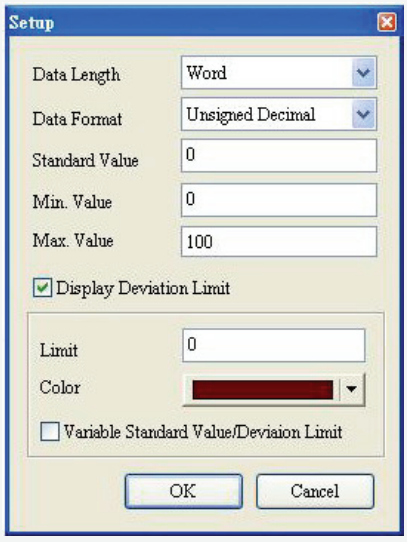
Table 3.4.1 Property Description of Bar Element

<table>
<tr><th colspan="5">Property Description of Normal Bar Element</th></tr>
<tr><td colspan="5">HMI reads the value of the corresponding PLC specific address (register) and converts the value to normal bar element and then displays it on the screen.</td></tr>
<tr><td>Read Address</td><td colspan="4">The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Text / Text Size
Font / Text Color</td><td colspan="4">The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Border Color</td><td colspan="4">It is used to set the border color of the normal bar element.</td></tr>
<tr><td>Foreground Color
Background Color</td><td colspan="4">It is used to set the foreground and background color of the normal bar element. For example, the foreground color of the following example bar element is green and its background color is yellow.
</td></tr>
<tr><td>Style</td><td>Standard
</td><td>Raised
</td><td colspan="2">Sunken
</td></tr>
<tr><td rowspan="4">Display Format</td><td>Left</td><td colspan="3">The display progressing direction is from right to the left.</td></tr>
<tr><td>Right</td><td colspan="3">The display progressing direction is from left to the right.</td></tr>
<tr><td>Top</td><td colspan="3">The display progressing direction is from bottom to the top.</td></tr>
<tr><td>Botom</td><td colspan="3">The display progressing direction is from top to the bottom.</td></tr>
<tr><td>Detail</td><td colspan="2">
</td><td>Data Length</td><td>There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td>Data Format</td><td colspan="2">There are following data format provided:
Word/Double Word
1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
</table>

Property Description of Normal Bar Element		
	Minimum Value	It is used to set the display minimum and maximum value.
	Maximum Value	
	Target Value Color	The user can decide if the target value display or not by using this option. If this option is set, the target value and its color set by the user will display on the screen. HMI will refer to the minimum and maximum value and draw the proper reference line on the bar element just like the figure shown below: (Here we set the target value is 50 and its color is in red. The maximum and minimum value is 100 and 0 respectively.) 
	Ranges (Enable range setting)	Please refer to the description of Low & High Region Color.
	Variable target/range limits	When the target value and low & high limit is a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.
	When the user has input the target value, low & high limit, and minimum & maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length and data format.	
Low Region Color High Region Color	This option is available and displayed in the property table only when the “Ranges” option in the Detail dialog box is selected. If the user sets the low limit value is 30 and the color of low limit region is in green, and then set the high limit value is 70 and the color of high limit region is in red, the bar element will be shown as the figures below (The min. & max. input value is 0 and 100 respectively.):  When the value is 20  When the value is 50  When the value is 80	

Table 3.4.1 Property Description of Bar Element

Property Description of Deviation Bar Element	
HMI reads the value of the corresponding PLC specific address (register). Subtract the setting standard value from this read value and the user has a deviation value. Then, the user can convert the deviation value to deviation bar element and then display it on the screen.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color that provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)
Border Color	It is used to set the border color of the deviation bar element.
Foreground Color Background Color	It is used to set the foreground and background color of the deviation bar element. For example, the foreground color of the following example bar element is green and its background color is yellow. 

<table>
<tr><th colspan="5">Property Description of Deviation Bar Element</th></tr>
<tr><td>Style</td><td>Standard</td><td colspan="2">Raised</td><td>Sunken</td></tr>
<tr><td></td><td></td><td colspan="2"></td><td></td></tr>
<tr><td>Display Format</td><td>Horizontal</td><td colspan="3">The deviation value display horizontally.</td></tr>
<tr><td></td><td>Vertical</td><td colspan="3">The deviation value display vertically.</td></tr>
<tr><td>Detail</td><td colspan="2">
</td><td>Data Length</td><td>There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td></td><td></td><td>Data Format</td><td>There are following data format provided:
Word/Double Word
1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td></td><td>Standard Value</td><td colspan="2">It is used to set the standard value for calculating deviation value.</td></tr>
<tr><td></td><td>Minimum Value</td><td colspan="2" rowspan="2">The minimum and maximum value in the deviation bar element.</td></tr>
<tr><td></td><td>Maximum Value</td></tr>
<tr><td></td><td>Display Deviation Limit</td><td colspan="2">The deviation limit and color can be set only when this option is selected. Also, the deviation value will display in the designated color set by the user. If this option is not selected, the deviation value will be displayed in the foreground color directly on the screen.</td></tr>
<tr><td></td><td>Variable Standard Value/Deviation Limit</td><td colspan="2">When standard value and high limit of deviation value is variable. The address of standard value is Read Address+1 and the address of deviation limit value is Read Address+2.</td></tr>
<tr><td></td><td colspan="3">When the user has input the standard value, minimum & maximum value and deviation limit, after pressing OK button, HMI will examine the value by referring to the selected data length and data format.</td></tr>
<tr><td></td><td colspan="3">For example, if the data length is set to Word, the data format is set to Unsigned Decimal, standard value is set to 50, minimum value is set to 0, maximum value is set to 100 and deviation limit is set to 20, the deviation bar element will be shown as the figures below:

When the value is 10 
When the value is 20

When the value is 70 
When the value is 90</td></tr>
</table>

3.5 Pipe Element

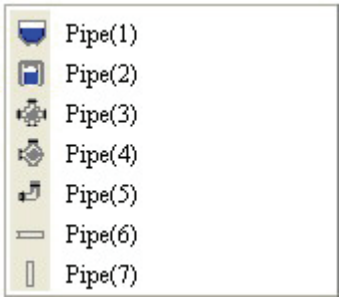
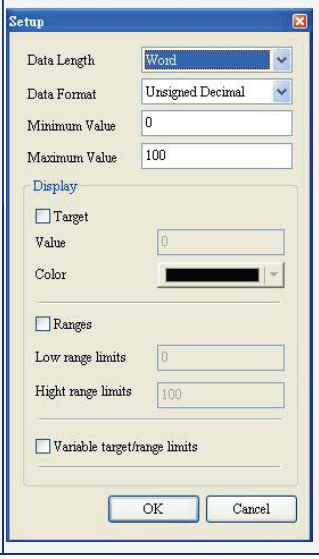


Fig. 3.5.1 Pipe element options

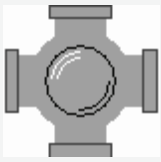
Table 3.5.1 Property Description of Pipe Element

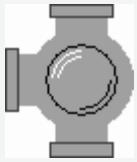
<table>
<tr><th colspan="4">Property Description of Pipe (1) / Pipe (2) Element</th></tr>
<tr><td colspan="4">HMI reads the value of the corresponding address (register). Then, convert the value to Pipe (1) / Pipe (2) element and then display it on the screen.</td></tr>
<tr><td>Read Address</td><td colspan="3">The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Text / Text Size
Font / Text Color</td><td colspan="3">The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>WaterMark Color
Inside Tube Color</td><td colspan="3">It is used to set the watermark color and inside tube color of Pipe (1) and Pipe (2) element.
Pipe (1) Element

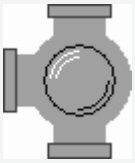
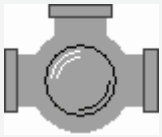
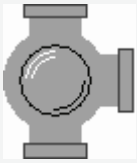
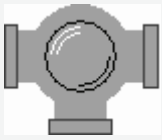
The watermark color is in blue.
The inside tube color is in black.
Pipe (2) Element

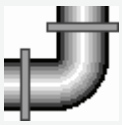
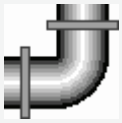
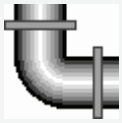
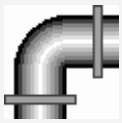
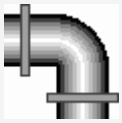
The watermark color is in red.
The inside tube color is in white.</td></tr>
<tr><td>Style</td><td>Standard
</td><td colspan="2">Rotation 180
</td></tr>
<tr><td>Detail Setup</td><td>
</td><td>Data Length</td><td>There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td></td><td></td><td>Data Format</td><td>There are following data format provided:
Word/Double Word
1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
</table>

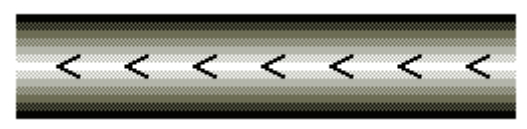
Property Description of Pipe (1) / Pipe (2) Element		
	Minimum Value	It is used to set the minimum and maximum capacity of the pipe element.
	Maximum Value	
	Target Value Color	The user can decide if the target value displays or not by using this option.
	Ranges (Enable range setting)	Please refer to the description of Low & High Region Color.
	Variable target/range limits	When the target value and low & high limit is a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.
	When the user has input the target value, low & high limit, and minimum & maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length and data format.	
Low Region Color High Region Color	This option is available and displayed in the property table only when the “Ranges” option in the Detail Setup dialog box is selected. If the user sets the low limit value is 30 and the color of low limit region is in green, and then set the high limit value is 70 and the color of high limit region is in red, the pipe element will be shown as the figures below:  When the value is 20  When the value is 50  When the value is 80	

Property Description of Pipe (3) Element	
It is used to connect to water pipe element. Pipe (3) element is shown as the figure below: 	
Pipe Gauge	Use this option to set the pipe gauge. The selectable range is from 1 ~ 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels and vise versa.

Property Description of Pipe (4) Element
It is used to connect to water pipe element. Pipe (4) element is shown as the figure below: 

Property Description of Pipe (4) Element				
Style	Standard	Rotation 90	Rotation 180	Rotation 270
				
Pipe Gauge	Use this option to set the pipe gauge. The selectable range is from 1 ~ 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels and vise versa.			

Property Description of Pipe (5) Element				
It is used to connect to several pipes. Pipe (5) element is shown as the figure below: 				
Style	Standard	Rotation 90	Rotation 180	Rotation 270
				
Pipe Gauge	Use this option to set the pipe gauge. The selectable range is from 1 ~ 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels and vise versa.			

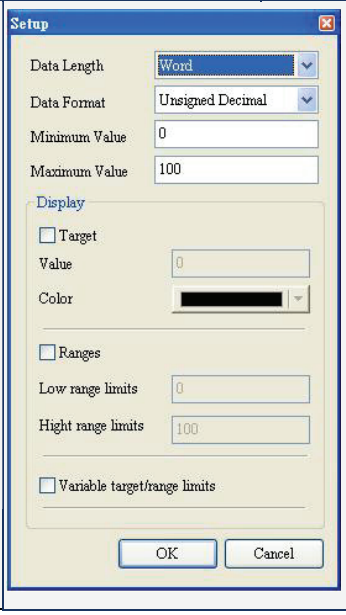
Property Description of Pipe (6) / Pipe (7) Element	
Horizontal and vertical pipes. It is used to display the direction of water flow.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) The user can decide if the read address is set or not. If the read address is set, the mobile cursor will display and move, just like the water flowing through the pipe. For example, suppose that the internal memory address of HMI is $0, when $0 is 1, and the mobile cursor color is set, the direction of water flow is from right to the left; when $0 is 2, the direction of water flow is from left to the right. When $0 is set to other value than 1 and 2, the water will not flow. In the same way, when the user select Pipe (7) element, for example, suppose that the internal memory address of HMI is $1, when $1 is 1, the direction of water flow is from bottom to the top; when $1 is 2, the direction of water flow is from top to the bottom. When $1 is set to other value than 1 and 2, the water will not flow. 
Mobile Cursor Color	When there is any data occurred in the read address, the mobile cursor will display and move, just like the water flowing through the pipe. The user can use this option to set the mobile cursor color.
Pipe Gauge	Use this option to set the pipe gauge. The selectable range is from 1 ~ 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels and vise versa.

3.6 Pie Element



Fig. 3.6.1 Pie element options

Table 3.6.1 Property Description of Pie Element

<table>
<tr><th colspan="5">Property Description of Pie Element</th></tr>
<tr><td colspan="5">There are four kinds of Pie elements for the user to select. The user can use the element property table to set the minimum & maximum value, low & high limit and element color, etc. It can be used to display the size of the set address and quickly judge its quantity by the increment and decrement measure of area. If the value of the address is less than the lower limit or higher than the high limit, it can change its color to show clearly for the user to recognize and give a warning to the user.</td></tr>
<tr><td>Read Address</td><td colspan="4">The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Text / Text Size
Font / Text Color</td><td colspan="4">The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Border Color
Foreground Color
Background Color</td><td colspan="4">It is used to set the border color, foreground and background color of the pie element. For example, the border color of the following example pie element is in blue, and the foreground color is set to green and its background color is in yellow.
</td></tr>
<tr><td>Style</td><td>Standard</td><td>Raised</td><td>Sunken</td><td>Transparent</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Detail Setup</td><td colspan="2">
</td><td>Data Length</td><td>There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td></td><td></td><td>Data Format</td><td>There are following data format provided:</td></tr>
<tr><td></td><td></td><td></td><td>Word/Double Word</td></tr>
<tr><td></td><td></td><td></td><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex</td></tr>
<tr><td></td><td></td><td>Minimum Value</td><td rowspan="2">It is used to set the minimum and maximum value of the pie element.</td></tr>
<tr><td></td><td></td><td>Maximum Value</td></tr>
</table>

Property Description of Pie Element		
	Target Value Color	The user can decide if the target value display or not by using this option. If this option is set, the target value and its color set by the user will display on the screen. HMI will refer to the minimum and maximum value and draw the proper reference line on the bar element just like the figure shown below: (Here we set the target value is 80 and its color is in yellow.) 
	Ranges (Enable range setting)	Please refer to the description of Low & High Region Color.
	Variable target/range limits	When the target value and low & high limit is a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.
	When the user has input the target value, low & high limit, and minimum & maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length and data format.	
Low Region Color High Region Color	This option is available and displayed in the property table only when the “Ranges” option in the Detail Setup dialog box is selected. If the user sets the low limit value is 30 and the color of low limit region is in green, and then set the high limit value is 70 and the color of high limit region is in red, the pie element will be shown as the figures below (The min. & max. input value is 0 and 100 respectively.):  When the value is 20  When the value is 50  When the value is 80	

3.7 Indicator

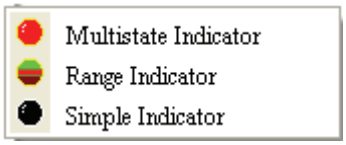
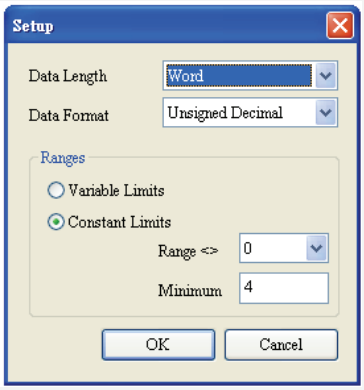


Fig. 3.7.1 Indicator element options

Table 3.7.1 Property Description of Multistate Indicator Element

Property Description of Multistate Indicator Element		
Multistate indicator provides a method to indicate the state of some specific address. It will send state changes message to user no matter it is Bit, LSB or WORD. If this address is an significant indicator or important message or important alarm, it can be used to inform the user immediately by changing state display method or different text setting. Or let the user know more information according to the changes of different states to make the user can also handle the corresponding situation at the first time.		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) When the read address is set to the contact of the controller, i.e. PLC, the multistate indicator will change depending on the state (ON or OFF) of PLC corresponding contact. For example, the user can set that when the value is 1, the indicator will display the text “Start” and when the value is 0, the indicator will display the text “Stop”. The user also can add a picture into each state of the multistate indicator and then the corresponding picture will show when each state is activated.	
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color that provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Twinkle	The element can twinkle to remind the user. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Picture Bank Name Picture Name	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Transparent Effect Transparent Color	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Foreground Color Style	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Data Length	Bit	Indicator element can have two states.
	Word	Indicator element can have 256 states.
	LSB	Indicator element can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to display the read memory content.	
Add/Remove State	It is used to set the state numbers of multistate indicator. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	

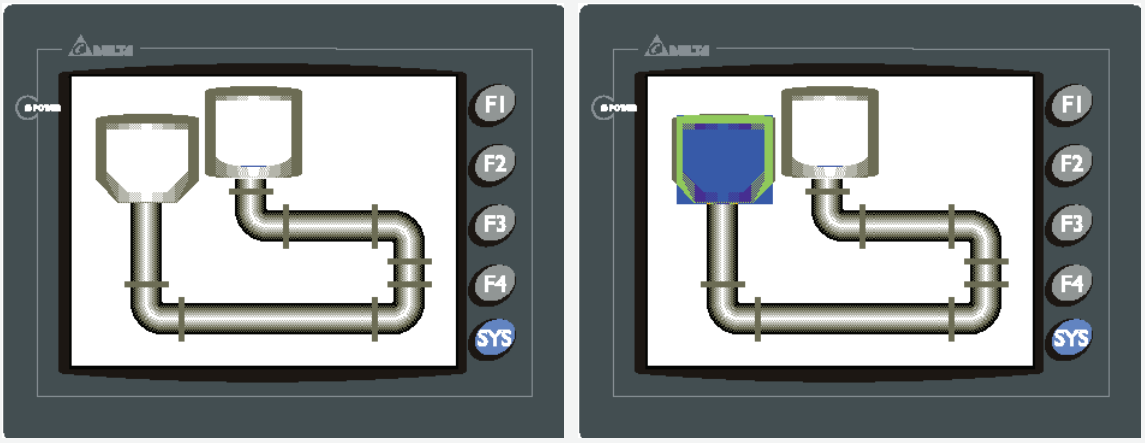
Table 3.7.2 Property Description of Range Indicator Element

<table>
<tr><th colspan="5">Property Description of Range Indicator Element</th></tr>
<tr><td colspan="5">Range indicator provides a method to indicate the state of some specific address. HMI reads the value of the corresponding address (register) and uses this read value to correspond with the corresponding range indicator element and its setting value, and then display the corresponding state on HMI screen.</td></tr>
<tr><td>Read Address</td><td colspan="4">The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)
The user also can add a picture into each state of the range indicator and then the corresponding picture will show when each state is activated.</td></tr>
<tr><td>Text / Text Size
Font / Text Color</td><td colspan="4">The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Twinkle</td><td colspan="4">The element can twinkle to remind the user. (Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Picture Bank Name
Picture Name</td><td colspan="4">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Transparent Effect
Transparent Color</td><td colspan="4">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Foreground Color
Style</td><td colspan="4">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Add/Remove State</td><td colspan="4">It is used to set the state numbers of range indicator. 1~256 states can be set.</td></tr>
<tr><td>Detail</td><td colspan="4">

<table>
<tr><td>Data Length</td><td>There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td>Data Format</td><td>There are following data format provided:
Word/Double Word
1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal</td></tr>
</table>
<table>
<tr><td>Range</td><td>Constant Limits</td><td colspan="4">Selecting this option can use default 5 states to set the range. If there is n numbers of states, it indicates that there is Range n-1 for the user to use. The user can specify the foreground color of state 0, 1, 2, 3, and 4 as red, green, blue, yellow and purple respectively.</td></tr>
<tr><td></td><td></td><td>Range 0</td><td>Range 1</td><td>Range 2</td><td>Range 3</td></tr>
<tr><td></td><td></td><td>100</td><td>50</td><td>33</td><td>1</td></tr>
<tr><td></td><td></td><td colspan="4">When the value of read address is higher than 100, the range indicator will display in red. When the value of the read address is higher than 50, the range indicator will display in green, and vise versa.</td></tr>
</table></td></tr>
</table>

Property Description of Range Indicator Element			
		Variable Limits	When this option is selected, there is Range n-1 for the user to use. n represents the total state numbers and n-1 represents the total range numbers. For example, if the read address is $0, and the total state number of the element is 5, it indicates that there is Range 0~4 for the user to use. Then, the lower limit value of Range 0 is $1, the lower limit value of Range 1 is $2 and vise versa.

Table 3.7.3 Property Description of Simple Indicator Element

Property Description of Simple Indicator Element	
For the user's convenience, simple indicator provides two states (ON/OFF) to let the user change the XOR color of the base picture quickly. In the following left example figure, there are simple indicator elements on the top of the pipe element. The simple indicator elements will change as shown as the right figure below. 	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color that provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)
XOR Color	It is used to set XOR color of base picture.

3.8 Data Display

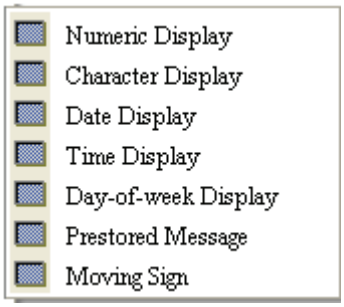


Fig. 3.8.1 Data Display element options

Table 3.8.1 Function of Data Display elements

Element Type	Function
Numeric Display	Display the value of the specific address.
Character Display	Display the text or character of the specific address.
Date Display	Display date of HMI.
Time Display	Display time of HMI.
Day-of-week Display	Display day-of-week of HMI.
Prestored Message	Display message according to the state of HMI.
Moving Sign	Display message by moving sign according to the state of HMI.

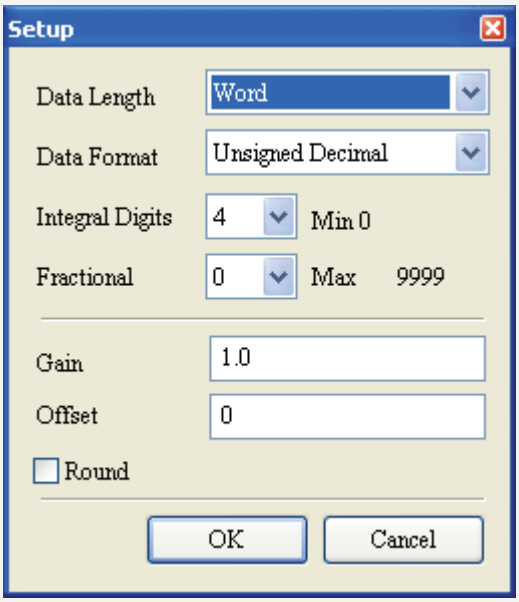
■ Numeric Display

Table 3.8.2 Property Description of Numeric Display Element

Property Description of Numeric Display Element				
This element will read the value of the setting address and display the read value immediately in the format set by the user.				
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)			
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.			
Border Color Background Color	Border Color option can be set only when the style of the numeric display element is selected as Raised and Sunken. The style of the element below is selected as “Sunken”. Its background color is set to green and its border color is set to red.  (If the style of the element is set to Transparent, the Border Color and Background Color these two options are disabled.)			
Style	Standard	Raised	Sunken	Transparent
				

<table>
<tr><th colspan="3">Property Description of Numeric Display Element</th></tr>
<tr><td>Leading Zero</td><td colspan="2">The following figures show the difference if the user selects the Leading Zero option. (Please note that the integral digit is set to 4 digits.)

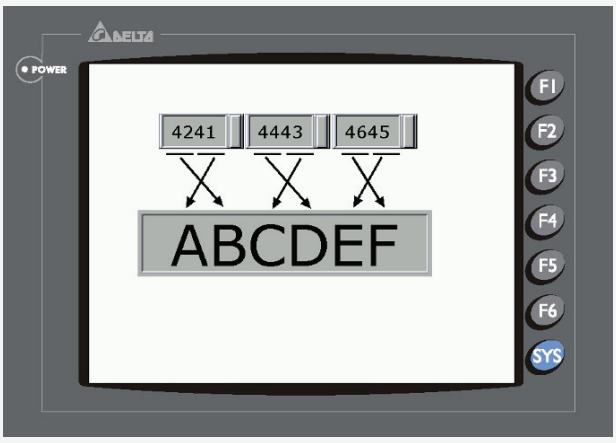

(If YES is selected, the numeric value will show as this one.)


(If NO is selected, the numeric value will show as this one.)</td></tr>
<tr><td rowspan="8">Detail</td><td colspan="2">
</td></tr>
<tr><td>Date Length</td><td>There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td>Data Format</td><td>There are following data format provided:
<table><tr><th>Word</th><th>Double Word</th></tr><tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary</td><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary
7. Floating</td></tr></table></td></tr>
<tr><td>Integral Digits</td><td rowspan="2">Use this option to determine the digit number of integer and decimal fraction. The digit number (Fractional Digits) here is not a real decimal value. It is only the display format. The digit number will be a real decimal only when the data format is selected as “Floating”.</td></tr>
<tr><td>Fractional Digits</td></tr>
<tr><td>Gain (a)</td><td rowspan="2">The user can use y = (a) x (read address value) + (b) this equation to determine the display numeric value (y). For example, if Gain value (a) is 2 and Offset value (b) is 3, when the read address value is 3, then the display numeric value will be equal to (2) x 3 + (3) = 9.
If Gain and Offset value is a decimal, please set the data format as “Floating”.</td></tr>
<tr><td>Offset (b)</td></tr>
<tr><td>Round off</td><td>If this option is selected, after the operation of the equation above, all numeric values can be rounded off and display on the screen.</td></tr>
</table>

Property Description of Numeric Display Element	
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, only 4 elements (including display element and input element) can be fast refreshed on one screen. If the user use this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary. The user can set the Fast Refresh Rate by clicking **Screen** > **Screen Properties** command. There are three levels of the Fast Refresh Rate and they are High, Medium and Low.

■ Character Display

Table 3.8.3 Property Description of Character Display Element

Property Description of Character Display Element	
The user can use this element to read the value of the specific address, convert them to text or character and display on the screen. The read value must be in ASCII format or the user cannot see the display text or character. (The max. string length is 28words.)	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)
Text Size Text Color	The user can set the text size and text color provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
String Length	The range is with 1 ~ 28 words. Set the read address as Internal Memory 0, i.e. $0, set the string length to 6, and create three Numeric Entry elements. Then, set the data format of these three Numeric Entry elements as hexadecimal and enter the value as follows: $0 = 4241 (Hex) $1 = 4443 (Hex) $2 = 4645 (Hex)  Then, the above screen will display. Please note that character display element reads the Byte value, and the data length of the internal memory $ address is Word, which is composed of two Bytes. Therefore, one Word can represent two Bytes. However, as the high byte and low byte of the value that read by the character display element will be exchanged, when reading the Internal Memory $0 (=4241 (Hex)), the real display character will become “AB” and vise versa. Please refer to the following table.

Property Description of Character Display Element	
	ASCII Code / Hex Cross Reference **ASCII** / **Hex** A 41 B 42 C 43 D 44 E 45 F 46
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, only 4 elements (including display element and input element) can be fast refreshed on one screen. If the user use this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary. The user can set the Fast Refresh Rate by clicking **Screen** > **Screen Properties** command. There are three levels of the Fast Refresh Rate and they are High, Medium and Low.

■ **Date Display**

Table 3.8.4 Property Description of Data Display Element

Property Description of Date Display Element	
Display HMI system date. There are several date formats selectable for the user to use.	
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Date Format	Provide **MM/DD/YY, DD/MM/YY, DD.MM.YY** three kinds of formats.

■ **Time Display**

Table 3.8.5 Property Description of Time Display Element

Property Description of Time Display Element	
Display HMI system time. There are several time formats selectable for the user to use.	
Text Size Text Color	The user can set the text size and text color that's provided by the HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Time Format	Provide **HH:MM:SS, HH:MM** two kinds of formats.

■ Day-of-week Display

Table 3.8.6 Property Description of Day-of-week Display Element

Property Description of Day-of-week Display Element		
Display the day (Sunday ~ Monday) of the week. The state default setting of the Day-of-week display element is set to 7. It indicates that there are 7 states for this element. The user can define the display text, font and color for each day directly in the property table.		
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)	
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)	

■ Prestored Message

Table 3.8.7 Property Description of Prestored Message Element

Property Description of Prestored Message Element		
Display the state content of PLC corresponding contact or register directly. The user can set state number and text for each state.		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)	
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)	
Data Type	Bit	It can have two states.
	Word	It can have 256 states.
	LSB	It can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Add/Remove State	It is used to set the state numbers of prestored message element. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	

■ Moving Sign

Table 3.8.8 Property Description of Moving Sign Element

Property Description of Moving Sign Element	
Moving sign is a sign that uses movement, lighting, or special display to depict and display the state content of the corresponding contact or register. The user can determine the display of the moving sign by the settings of the direction, moving points, and interval (ms) in the property table.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)

Property Description of Moving Sign Element		
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color provided by **Windows®** to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)	
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)	
Data Type	Bit	It can have two states.
	Word	It can have 256 states.
	LSB	It can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Add/Remove State	It is used to set the state numbers of moving sign element. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	
Direction	Left	The display progressing direction is from right to the left.
	Right	The display progressing direction is from left to the right.
	Top	The display progressing direction is from bottom to the top.
	Bottom	The display progressing direction is from top to the bottom.
Moving Points	It is used to set the movement of the moving sign. The unit is Pixel and the range is within 1 ~ 50 Pixels.	
Interval(ms)	It is used to set the interval time between two movements. The unit is ms and the range is within 50 ~ 3000 ms.	

3.9 Graph Display

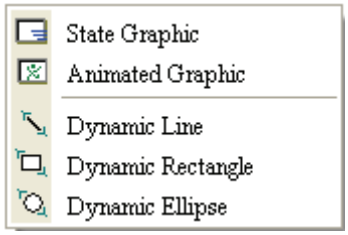


Fig. 3.9.1 Graph Display element options

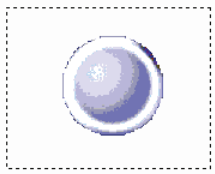
Table 3.9.1 Function of Graph Display elements

Element Type	Icon	Function
State Graphic		It is used to create and display one or more state pictures on the certain positions of the HMI screen. Different pictures can be shown on the screen according to the different states.
Animated Graphic		It is used to create and display one or more animated pictures on any position of the HMI screen. The user can control the X and Y direction to move and show the animated pictures freely. Different pictures can be shown on the screen according to the different states.
Dynamic Line		It is used to draw and display a dynamic line on the HMI screen. The user can control the X and Y direction to move the dynamic line element and change its size freely.
Dynamic Rectangle		It is used to draw and display a dynamic rectangle on the HMI screen. The user can control the X and Y direction to move the dynamic rectangle element and change its size freely.
Dynamic Ellipse		It is used to draw and display a dynamic ellipse on the HMI screen. The user can control the X and Y direction to move the dynamic ellipse element and change its size freely.

■ Static Graphic

Table 3.9.2 Property Description of Static Graphic Element

Property Description of Static Graphic Element		
When HMI is connected to the controller, the user can create static graphic elements to read the value of several read addresses controlled by the controller. The read value of each state can be converted and transmitted to the static graphic elements and display respectively on the HMI screen.		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Picture Bank Name Picture Name	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Transparent Effect Transparent Color	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Foreground Color	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Data Length	Bit	It can have two states.
	Word	It can have 256 states.
	LSB	It can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	

<table>
<tr><th colspan="3">Property Description of Static Graphic Element</th></tr>
<tr><td>Add/Remove State</td><td colspan="2">It is used to set the state numbers of static graphic element. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.</td></tr>
<tr><td rowspan="3">Auto Change</td><td>No</td><td>When this option is selected, the value of the read address will be regarded as the state number. It means that the state number is determined by the value of the read address. For example, if the value of the read address $0 is 0, it will switch to 0th state; if the value of the read address $0 is 5, it will switch to 5th state.</td></tr>
<tr><td>Yes</td><td>When this option is selected and the value of the read address is a non-zero value, the static graphic element will change automatically. For example, if the value of the read address $0 is 1 and higher (a non-zero value), the element will change the picture automatically according to the change time that the user set. When the value of the read address $0 is set to 0, the static graphic element will be back to the initial state and will not change the picture automatically.</td></tr>
<tr><td>Variation</td><td>When this option is selected, the property of the Read Address will be the condition of changing element picture. The element will change the picture automatically according to Read Address+1. For example, if $0 is set to display the address of the element and $1 is set to change the element picture, when the value of the read address $1is 0, the user needs to use the read address $0 to switch the state of the static graphic element. At this time, the static graphic element will not change automatically, like when “No” option is selected. When $1 is 1 and higher (a non-zero value), the static graphic element will change the picture automatically, like when “Yes” option is selected.</td></tr>
<tr><td rowspan="3">Transparent</td><td colspan="2">If Yes is selected, it indicates that this element will be displayed in transparent color. It is usually used with the transparent color setting of the element. Please refer to the following example elements:</td></tr>
<tr><td colspan="2"><table><tr><td></td><td></td><td></td></tr><tr><td>The transparent color has not been set yet.</td><td>The element transparent color has been set.</td><td>The transparent color of the whole drawing has been set.</td></tr></table></td></tr>
<tr><td colspan="2">Note: If Yes is selected (set to Transparent), the foreground color option is disabled.</td></tr>
</table>

Example of Static Graphic element:

The designated read address = D100. The internal memory value and each state should be as follows:



D100=0 D100=1 D100=2 D100=3 D100=4

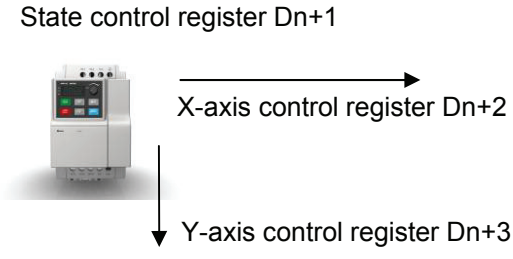
■ Animated Graphic

Table 3.9.3 Property Description of Animated Graphic Element

Property Description of Animated Graphic Element		
When HMI is connected to PLC, the user can create animated graphic elements to read the value of several read addresses controlled by PLC. The read value of each state can be converted and transmitted to the animated graphic elements and display on the HMI screen. The individual movement and moving position can also be controlled and show on the HMI screen.		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
	Read Address	Use the value of Read Address to switch the state of animated graphic element.
	Read Address+1	Use the value of Read Address+1 to be the horizontal axis position of the animated graphic element.
	Read Address+2	Use the value of Read Address+2 to be the vertical axis position of the animated graphic element.
Picture Bank Name Picture Name	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Transparent Effect Transparent Color	(Please refer to Table 3.2.2 Property Description of General Buttons.)	
Clear Picture	Use this option to clear previous animated graphic element when moving the element or changing the state of the element.	
Data Length	Word	It can have 256 states.
	LSB	It can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Add/Remove State	It is used to set the state numbers of animated graphic. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	

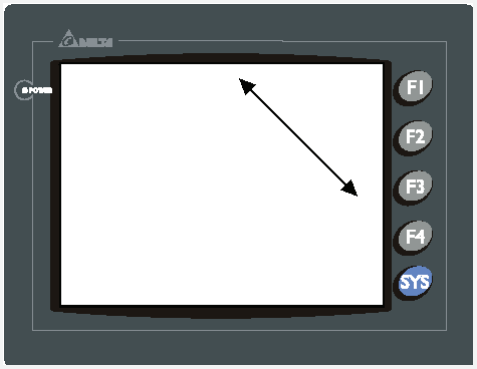
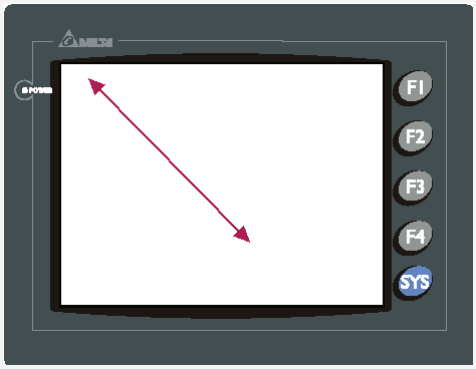
Example of Animated Graphic element:

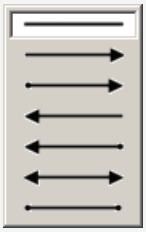
The designated read address = D100. The internal memory value and each state should be as follows:



■ Dynamic Line

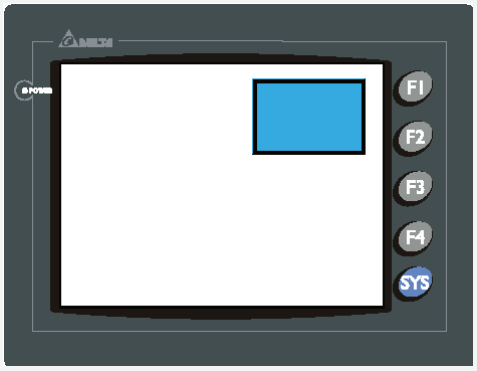
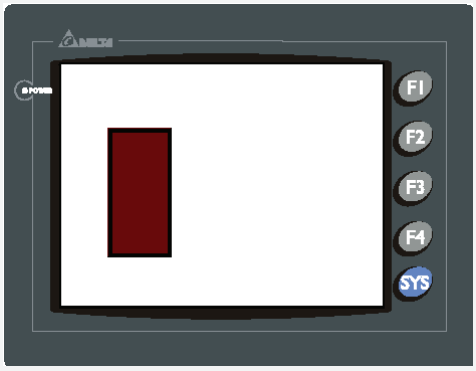
Table 3.9.4 Property Description of Dynamic Line Element

Property Description of Dynamic Line Element		
The dynamic line element can be changed and moved depending on the value of the corresponding contact or register.  		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
	Read Address	The value of the Read Address can be used only when Variable Position option is set to Yes. It is used to represent the left-top horizontal position (Left) of the element, i.e. the first X coordinate on the screen (X_1).
	Read Address +1	The value of the Read Address+1 can be used only when Variable Position option is set to Yes. It is used to represent the left-top vertical position (Top) of the element, i.e. the first Y coordinate on the screen (Y_1).
	Read Address +2	The value of the Read Address+2 can be used only when Variable Position option is set to Yes. It is used to represent the right-bottom horizontal position (Right) of the element, i.e. the second X coordinate on the screen (X_2).
	Read Address +3	The value of the Read Address+3 can be used only when Variable Position option is set to Yes. It is used to represent the right-bottom vertical position (Bottom) of the element, i.e. the second Y coordinate on the screen (Y_2)..
	Read Address +4	The value of the Read Address+4 can be used only when Variable Color option is set to Yes. It is used to represent the line color. The range is different depending on selected HMI. The range for 16 shades of gray model is within 0 ~ 15, the range for 256 colors model is within 0 ~ 255 and the range for 65536 colors is within 0 ~ 65536.
	Read Address +5	The value of the Read Address+5 can be used only when Twinkle option is set to Yes. When the value is higher than 1, the dynamic line element will twinkle. If the value is 0, it will not twinkle.
Line Color	It is used to set the display color of the dynamic line element.	
Twinkle	The element can twinkle to remind the user. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Line Size	The unit is Pixel and the range is within 1 ~ 8.	
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	

Property Description of Dynamic Line Element	
Line Style	There are following line styles can be selected. 
Variable Position	(Please refer to the description of Read Address above)
Variable Color	(Please refer to the description of Read Address above)

■ Dynamic Rectangle

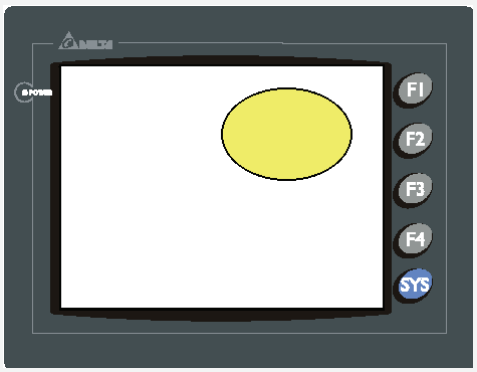
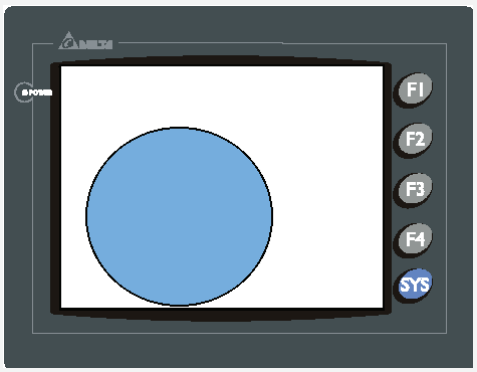
Table 3.9.5 Property Description of Dynamic Rectangle Element

Property Description of Dynamic Rectangle Element		
The dynamic rectangle element, including element size and color can be changed and moved depending on the value of the corresponding contact or register.  		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
	Read Address	The value of the Read Address can be used only when Variable Position option is set to Yes. It is used to represent the left-top horizontal position (Left) of the element, i.e. the first X coordinate on the screen (X_1).
	Read Address +1	The value of the Read Address+1 can be used only when Variable Position option is set to Yes. It is used to represent the left-top vertical position (Top) of the element, i.e. the first Y coordinate on the screen (Y_1)..
	Read Address +2	The value of the Read Address+2 can be used only when Variable Size option is set to Yes. It is used to represent the right-bottom horizontal position (Right) of the element, i.e. the width.
	Read Address +3	The value of the Read Address+3 can be used only when Variable Size option is set to Yes. It is used to represent the right-bottom vertical position (Bottom) of the element, i.e. the height.
	Read Address +4	The value of the Read Address+4 can be used only when Variable Color option is set to Yes. It is used to represent the line color. The range is different depending on selected HMI. The range for 16 shades of gray model is within 0 ~ 15, the range for 256 colors model is within 0 ~ 255 and the range for 65536 colors is within 0 ~ 65536.

Property Description of Dynamic Rectangle Element		
	Read Address +5	The value of the Read Address+5 can be used only when Twinkle option is set to Yes. When the value is higher than 1, the dynamic line element will twinkle. If the value is 0, it will not twinkle.
	Please note that when Variable Position option is set to No, the internal memory address of Variable Size option will increase one (one increment) automatically. (Read Address will represent the right-bottom horizontal position (Right) of the element. Read Address+1 will represent the right-bottom vertical position (Bottom) of the element. Read Address+2 will represent the foreground color of the element.)	
Twinkle	The element can twinkle to remind the user. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Foreground Color	It is used to set the foreground color of the dynamic rectangle element.	
Line Size	The unit is Pixel and the range is within 1 ~ 8.	
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.	
Round Radius	0~38 pixels round radius are provided for selection. 	
Variable Position	(Please refer to the description of Read Address above)	
Variable Size	(Please refer to the description of Read Address above)	
Variable Color	(Please refer to the description of Read Address above)	

■ Dynamic Ellipse

Table 3.9.6 Property Description of Dynamic Ellipse Element

Property Description of Dynamic Ellipse Element		
The dynamic ellipse element, including element size and color can be changed and moved depending on the value of the corresponding contact or register.  		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
	Read Address	The value of the Read Address can be used only when Variable Central Point option is set to Yes. It is used to represent the horizontal position of the element center point, i.e. the first X coordinate on the screen (X_1).

Property Description of Dynamic Ellipse Element		
	Read Address +1	The value of the Read Address+1 can be used only when Variable Central Point option is set to Yes. It is used to represent the vertical position of the element center point, i.e. the first Y coordinate on the screen (Y_1).
	Read Address +2	The value of the Read Address+2 can be used only when Variable Radius option is set to Yes. It is used to represent the horizontal radius of the element, i.e. the width.
	Read Address +3	The value of the Read Address+3 can be used only when Variable Radius option is set to Yes. It is used to represent the vertical radius of the element, i.e. the height.
	Read Address +4	The value of the Read Address+4 can be used only when Variable Color option is set to Yes. It is used to represent the line color. The range is different depending on selected HMI. The range for 16 shades of gray model is within 0 ~ 15, the range for 256 colors model is within 0 ~ 255 and the range for 65536 colors is within 0 ~ 65536.
	Read Address +5	The value of the Read Address+5 can be used only when Twinkle option is set to Yes. When the value is higher than 1, the dynamic line element will twinkle. If the value is 0, it will not twinkle.
	Please note that when Variable Central Point option is set to No, the internal memory address of Variable Radius option will increase one (one increment). (Read Address will represent the horizontal radius of the element. Read Address+1 will represent the vertical radius of the element. Read Address+2 will represent the foreground color of the element.)	
Line Color	It is used to set the display color of the dynamic ellipse element.	
Twinkle	The element can twinkle to remind the user. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
Foreground Color	It is used to set the foreground color of the dynamic ellipse element.	
Line Size	The unit is Pixel and the range is within 1 ~ 8.	
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.	
Variable Central Point	(Please refer to the description of Read Address above)	
Variable Radius	(Please refer to the description of Read Address above)	
Variable Color	(Please refer to the description of Read Address above)	

Dynamic Line

If the variable position, variable color and twinkle options are all set to Yes, and the address of the input element is D0, then

D0=X

D1=Y

D2=X1

D3=Y1

D4=Color

D5=Twinkle [0(not twinkle);1and higher (twinkle)]

Dynamic Rectangle

If the variable position, variable size, variable color and twinkle options are all set to Yes, and the address of the input element is D0, then

D0=X

D1=Y

D2=Width

D3=Height

D4=Color

D5=Twinkle [0(not twinkle);1and higher (twinkle)]

Dynamic Ellipse

If the variable central point, variable radius, variable color and twinkle options are all set to Yes, and the address of the input element is D0, then

D0=X

D1=Y

D2=Width of the Ellipse

D3=Height of the Ellipse

D4=Color

D5=Twinkle [0(not twinkle);1and higher (twinkle)]

No matter the dynamic line or dynamic ellipse element, the needed address (register) will not be the same according to the different property settings of the element selected by the user.

For example,

Regarding the dynamic rectangle element, if the address of the input element is D0, when the color option is variable only and the other options are not variable, only D0 is meaningful.

D0=Color

But when the size and color options are variable and the other options are not variable, the meaning of the address will become the following:

D0=Width

D1=Height

D2= Twinkle

3.10 Input Display

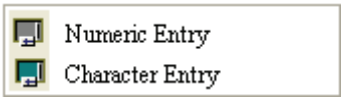


Fig. 3.10.1 Input element options

Set write and read address for the user to input and display address value. Write and read address can be the same or different.

Table 3.10.1 Function of Input elements

Element Type	Icon	Function
Numeric Entry		It is used to input and display the numeric value of designated address.
Character Entry		It is used to input and display the characters of specific designated address.

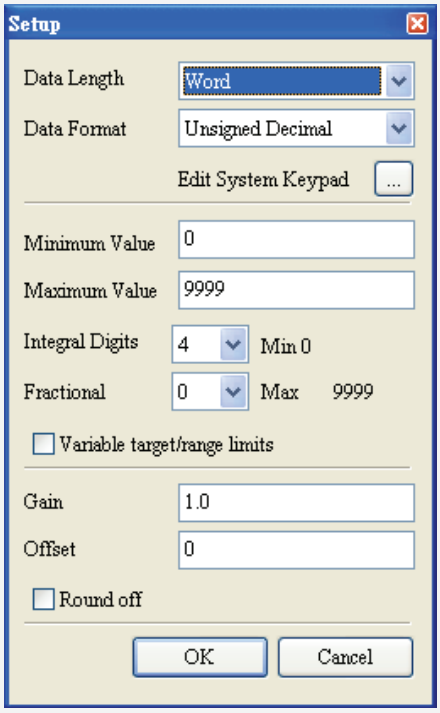
■ **Numeric Entry**

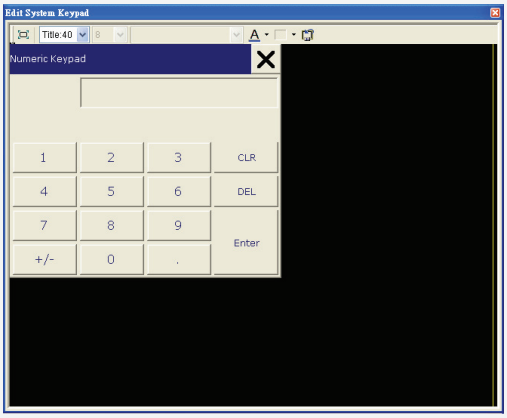
Table 3.10.2 Property Description of Numeric Entry Element

Property Description of Numeric Entry Element				
After pressing this numeric entry element on the screen, a system built-in numeric keypad (TEN-KEY) will show up and the user can use it to input the setting value directly. When pressing ENTER key, HMI will send the input setting value to the corresponding register. The maximum and minimum input setting values are all user-defined. The user can also specify the trigger mode to trigger the designated PLC address before or after writing the setting value.				
Write Address Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) If only the write address is set, HMI will read the value of the write address automatically.			
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.			
Border Color Background Color	Border Color option can be set only when the style of the numeric entry element is selected as Raised and Sunken. The style of the element below is selected as “Rasied”. Its background color is set to blue and its border color is set to red.  (If the style of the element is set to Transparent, the Border Color and Background Color these two options are disabled.)			
Style	Standard	Raised	Sunken	Transparent
				

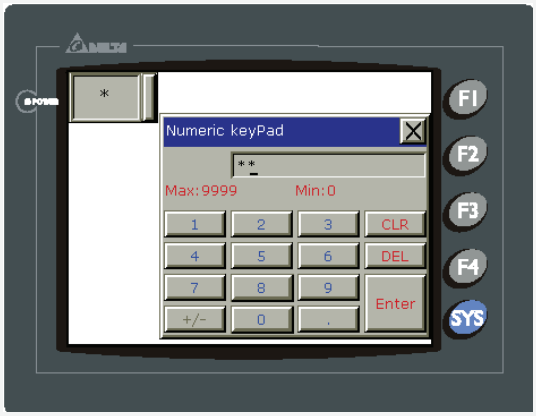
<table>
<tr><th colspan="3">Property Description of Numeric Entry Element</th></tr>
<tr><td>Leading Zero</td><td colspan="2">The following figures show the difference if the user selects the Leading Zero option. (Please note that the integral digits are set to 4.)


(If YES is selected, the numeric value will show as this one.)


(If NO is selected, the numeric value will show as this one.)</td></tr>
<tr><td>Trigger
Trigger Mode</td><td colspan="2">The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.</td></tr>
<tr><td>Detail</td><td colspan="2">
</td></tr>
<tr><td></td><td>Date Length</td><td>There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td></td><td>Data Format</td><td>There are following data format provided:
<table><tr><th>Word</th><th>Double Word</th></tr><tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary</td><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary
7. Floating</td></tr></table></td></tr>
<tr><td></td><td>Edit System Keypad</td><td>When the input mode is Touch Popup, the user can define the style of the keypad, including title, font, font size, font color and keypad color. The position that the system keypad cannot display will be placed in the center of the screen.</td></tr>
</table>

<table>
<tr><th colspan="3">Property Description of Numeric Entry Element</th></tr>
<tr><td rowspan="11"></td><td rowspan="6"></td><td>

<table>
<tr><td></td><td>Adjust the system keypad size</td></tr>
<tr><td>Title:30</td><td>Set the height of the title bar</td></tr>
<tr><td>10</td><td>Set the font size</td></tr>
<tr><td>Verdana</td><td>Set the font</td></tr>
<tr><td>A</td><td>Set the font color</td></tr>
<tr><td></td><td>Set the background color</td></tr>
</table></td></tr>
<tr><td>Minimum
Maximum</td><td>The user can set the minimum and maximum of input setting value to determine the range of input setting value.</td></tr>
<tr><td>Integral Digits
Fractional</td><td>Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as “Floating”.</td></tr>
<tr><td colspan="2">When Variable Minimum/Maximum Value option is selected, it indicates that the minimum value is determined by Read Address+1 and the maximum value is determined by Read Address+2.</td></tr>
<tr><td>Gain (a)
Offset (b)</td><td>The user can use y = (a) x (read address value) + (b) this equation to determine the display numeric value (y). For example, if Gain value (a) is 2 and Offset value (b) is 3, when the read address value is 3, then the display numeric value will be equal to (2) x 3 + (3) = 9.
If Gain and Offset value is a decimal, please set the data format as “Floating”.</td></tr>
<tr><td>Round off</td><td>If this option is selected, after the operation of the equation above, all numeric values can be rounded off and display on the screen.</td></tr>
<tr><td colspan="2">When the user have input the minimum and maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length, data format, integral and fractional digits.</td></tr>
<tr><td>Input Mode</td><td colspan="2">There are Touch Popup, Active Non-Popup and Touch Non-Popup three options. The default setting is Touch Popup. For the description of Active Non-Popup and Touch Non-Popup mode, please refer to section 3.15 Keypad Element.</td></tr>
<tr><td>User Security Level</td><td colspan="2">Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.</td></tr>
</table>

Property Description of Numeric Entry Element	
Display Asterisk (*)	If YES is selected, the screen will show as the following figure when inputting the setting value. 
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, only 4 elements (including display element and input element) can be fast refreshed on one screen. If the user use this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary. The user can set the Fast Refresh Rate by clicking **Screen** > **Screen Properties** command. There are three levels of the Fast Refresh Rate and they are High, Medium and Low.
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of “InterLock Level”), this button can be enabled.
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. (Please refer to Table 3.2.2 Property Description of General Buttons.)
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. (Please refer to Table 3.2.2 Property Description of General Buttons.)

Example of Numeric Entry element:

After pressing the numeric entry element, a system built-in numeric keypad (TEN-KEY) will display on the screen as shown in the figure below. The example here is selecting Touch Popup input mode to input numeric value 99 into corresponding PLC register, D100.

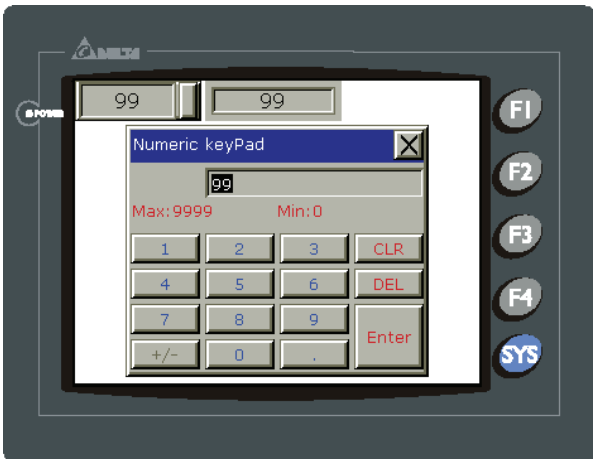
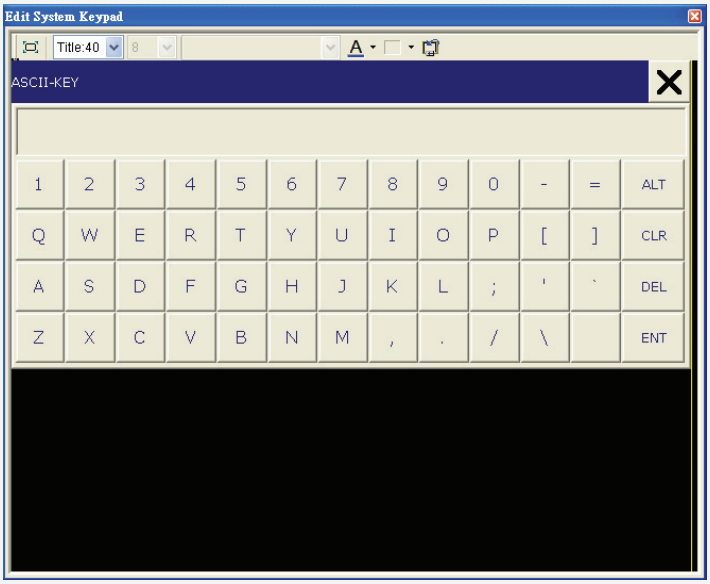


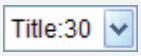
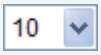
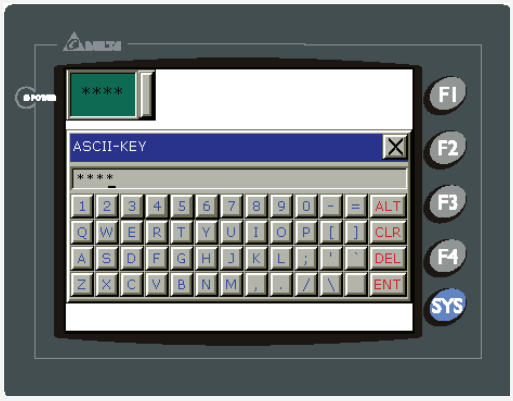
Fig. 3.10.2 TEN-KEY input dialog box

■ Character Entry

Table 3.10.3 Property Description of Character Entry Element

<table>
<tr><th colspan="5">Property Description of Character Entry Element</th></tr>
<tr><td colspan="5">The user can set write and read address to input the data of the specific address by text or character and display them on the screen. The input and display text or character must be in ASCII format. Write and read address can be the same or different. (The max. string length is 28words.)</td></tr>
<tr><td>Write Address
Read Address</td><td colspan="4">The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)
If only the write address is set, HMI will read the value of the write address automatically.</td></tr>
<tr><td>Text Size
Text Color</td><td colspan="4">The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.</td></tr>
<tr><td>Border Color
Background Color</td><td colspan="4">Border Color option can be set only when the style of the character entry element is selected as Raised and Sunken. The style of the element below is selected as “Raised”. Its background color is set to blue and its border color is set to gray.

(If the style of the element is set to Transparent, the Border Color and Background Color these two options are disabled.)</td></tr>
<tr><td>Style</td><td>Standard</td><td>Raised</td><td>Sunken</td><td>Transparent</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Character Length</td><td colspan="4">The range is with 1 ~ 28 words. The default setting is 4words.</td></tr>
<tr><td>Trigger
Trigger Mode</td><td colspan="4">The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.</td></tr>
<tr><td>Edit System Keypad</td><td colspan="4">When the input mode is Touch Popup, the user can define the style of the keypad, including title, font, font size, font color and keypad color. The position that the system keypad cannot display will be placed in the center of the screen.
</td></tr>
</table>

Property Description of Character Entry Element	
	 Adjust the system keypad size  Set the height of the title bar  Set the font size  Set the font  Set the background color  Set the background color
Input Mode	There are Touch Popup, Active Non-Popup and Touch Non-Popup three options. The default setting is Touch Popup. For the description of Active Non-Popup and Touch Non-Popup mode, please refer to section 3.15 Keypad Element.
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.
Display Asterisk (*)	If YES is selected, the screen will show as the following figure when inputting the setting value. 
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, only 4 elements (including display element and input element) can be fast refreshed on one screen. If the user use this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary. The user can set the Fast Refresh Rate by clicking **Screen** > **Screen Properties** command. There are three levels of the Fast Refresh Rate and they are High, Medium and Low.
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of “InterLock Level”), this button can be enabled.
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. (Please refer to Table 3.2.2 Property Description of General Buttons.)
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. (Please refer to Table 3.2.2 Property Description of General Buttons.)

3.11 Curve Element

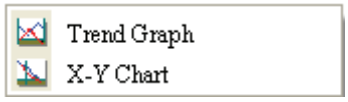


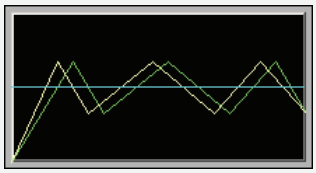
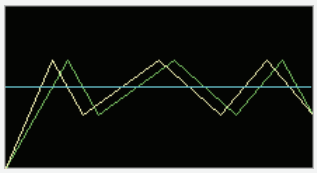
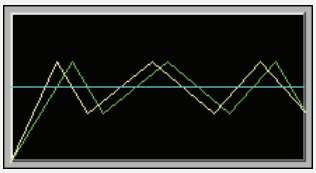
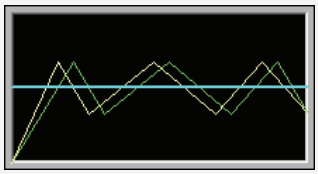
Fig. 3.11.1 Curve element options

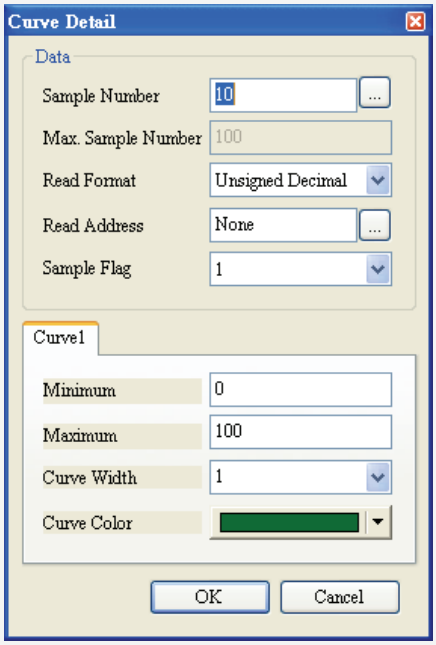
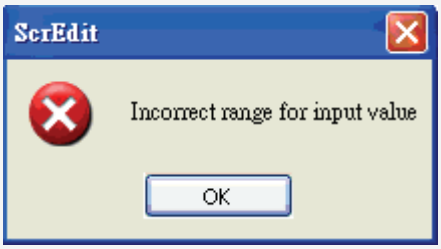
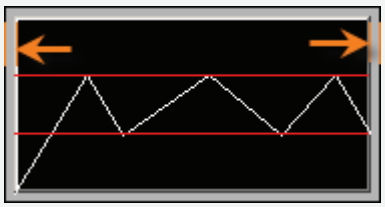
Table 3.11.1 Function of Curve elements

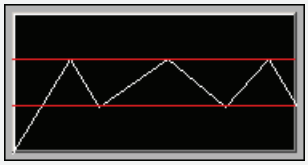
Element Type	Icon	Function
Trend Graph		It is used to display the value change of the read address by trend graph. The trend graph can display and set the change of Y-axis.
X-Y Chart		It is used to display the value change of the read address by trend graph. The trend graph can display and set the change of X-axis and Y-axis simultaneously.

■ Trend Graph

Table 3.11.2 Property Description of Trend Graph Element

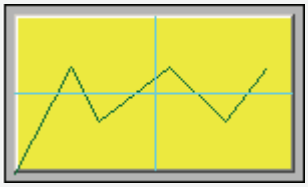
Property Description of Trend Graph Element			
The first step for setting trend graph is to set the curve number in “Curve Field Total” option (range is 1~4) in property table. Then, setting the read address, read format, curve width and color in “Detail Setup” option to complete the setup. The trend graph will continuously read numbers of addresses from the read address set by the user, convert the read data into trend graph and display on HMI screen. The numbers of the addresses is determined by the setting of “Sample Number”. This function is used to read the values of the internal memory addresses and display on HMI screen statically. After setting, the user needs to set the specific address of the control block to trigger the drawing and clear operation of the trend graph. For the settings of the control block, please refer to Chapter 5.			
Border Color Background Color	Border Color option can be set only when the style of the trend graph element is selected as Raised and Sunken. The style of the element below is selected as “Raised”. Its background color is set to black and its border color is set to gray. 		
Style	Standard	Raised	Sunken
			
Curve Field Total	1~4 curves can be set and displayed.		

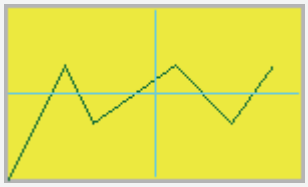
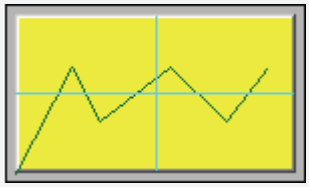
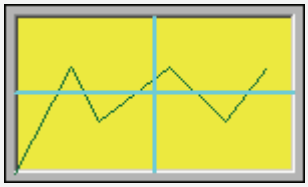
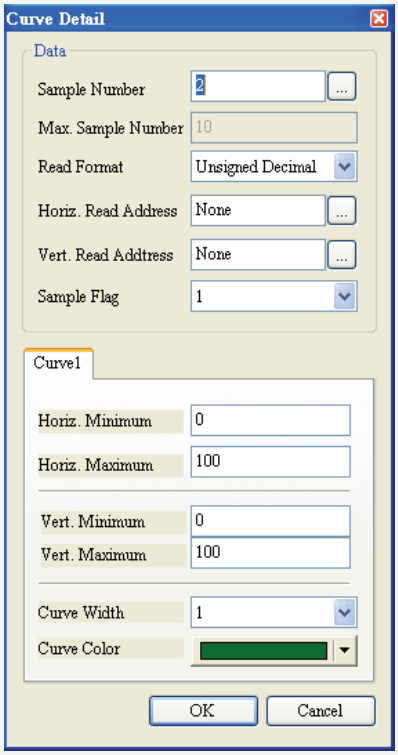
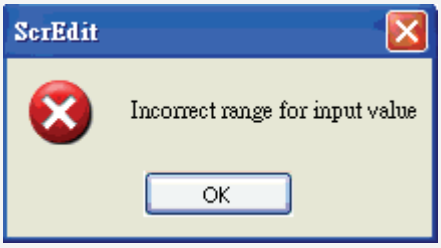
Property Description of Trend Graph Element		
Detail Setup		
	Sample Number Max. Sample Number	Sample Number can be set to a constant or a variable value. When Sample Number is a constant: The sample number represents a curve which is composed of the data of several addresses (registers). When the sample number exceeds the width range that the element can draw, the following warning dialog box will display.  It means that if the allowable width range of the created element is 10 sample numbers, when the sample number set by the user is higher than 10, the warning dialog box above will display.  **Please note that when the sample number is a constant, the Max. Sample Number option is disabled.** When Sample Number is a variable value: When the sample number is set to the address (register), the sample number is a variable value. The user can change the value of the address to modify the sample number at the same time. When the sample number is a variable value, the Max. Sample Number option must be set. If the read value is more than the set Max. Sample Number, the system will take the set Max. Sample Number as the actual maximum sample number.

Property Description of Trend Graph Element		
	Read Format	**Word** 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex
	Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) The trend graph will continuously read numbers of addresses from the read address set by the user, convert the read data into trend graph and display on HMI screen. The numbers of the addresses is determined by the setting of “Sample Number”.
	Sample Flag	It is used to set trigger and clear flag. When sample flag is triggered, it will start to read data and draw the graph. This sample flag is located within the control block. Please refer to Chapter 5 for the settings of the control block.
	Minimum	It is used to set the minimum and maximum value of the display data, i.e. the minimum and maximum value of Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
	Maximum	
	Curve Width	It is used to the display curve width. The range is within 1 ~ 8 and the unit is pixel.
	Curve Color	It is used to the display curve color.
Grid Color	Please refer to the figure below. The grid color is set to red and the grid number in horizontal direction is set to 3. 	
Grid Number in Horiz.		

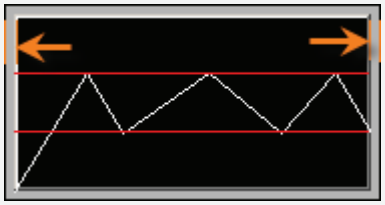
■ X-Y Chart

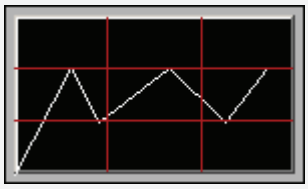
Table 3.11.3 Property Description of X-Y Chart Element

Property Description of X-Y Chart Element	
HMI will read and convert a series value of setting address to a X-Y chart on the screen. This function is used to read the values of the internal memory addresses and display on HMI screen statically. After setting, the user needs to set the specific address of the control block to trigger the drawing and clear operation of the trend graph, i.e. Trend Draw and Trend Clear. For the settings of the control block, please refer to Chapter 5.	
Border Color Background Color	Border Color option can be set only when the style of the X-Y chart element is selected as Raised and Sunken. The style of the element below is selected as “Raised”. Its background color is set to yellow and its border color is set to gray. 

<table>
<tr><th colspan="4">Property Description of X-Y Chart Element</th></tr>
<tr><td>Style</td><td>Standard</td><td>Raised</td><td>Sunken</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Connect Two Points</td><td colspan="3">If Yes option is selected, when drawing the X-Y chart on the screen, the space between two points on the X-Y chart will be connected by lines.</td></tr>
<tr><td>Curve Field Total</td><td colspan="3">1~4 curves can be set and displayed.</td></tr>
<tr><td>Detail Setup</td><td colspan="3">
</td></tr>
<tr><td></td><td>Sample Number
Max. Sample Number</td><td colspan="2">Sample Number can be set to a constant or a variable value.
When Sample Number is a constant:
The sample number represents a curve which is composed of the data of several addresses (registers). When the sample number exceeds the width range that the element can draw, the following warning dialog box will display.


It means that if the allowable width range of the created element is 10 sample numbers, when the sample number set by the user is higher than 10, the warning dialog box above will display.</td></tr>
</table>

Property Description of X-Y Chart Element		
		 **Please note that when the sample number is a constant, the Max. Sample Number option is disabled.** When Sample Number is a variable value: When the sample number is set to the address (register), the sample number is a variable value. The user can change the value of the address to modify the sample number at the same time. When the sample number is a variable value, the Max. Sample Number option must be set. If the read value is more than the set Max. Sample Number, the system will take the set Max. Sample Number as the actual maximum sample number.
	Read Format	**Word** 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex
	Horiz. Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) The X-Y chart will continuously read numbers of addresses from the horizontal read address set by the user, convert the read data into the points of X-axis and display on HMI screen. The numbers of the addresses is determined by the setting of “Sample Number”.
	Vert. Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) The X-Y chart will continuously read numbers of addresses from the vertical read address set by the user, convert the read data into the points of Y-axis and display on HMI screen. The numbers of the addresses is determined by the setting of “Sample Number”.
	Sample Flag	It is used to set trigger and clear flag. When sample flag is triggered, it will start to read data and draw the X-Y chart. This sample flag is located within the control block 2. Please refer to Chapter 5 for the settings of the control block.
	Horiz. Minimum	It is used to set the minimum and maximum value of the horizontal display data, i.e. the minimum and maximum value of X-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
	Horiz. Maximum	
	Horiz. Minimum	It is used to set the minimum and maximum value of the vertical display data, i.e. the minimum and maximum value of Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
	Horiz. Maximum	
	Curve Width	It is used to the display curve width. The range is within 1 ~ 8 and the unit is pixel.
	Curve Color	It is used to the display curve color.

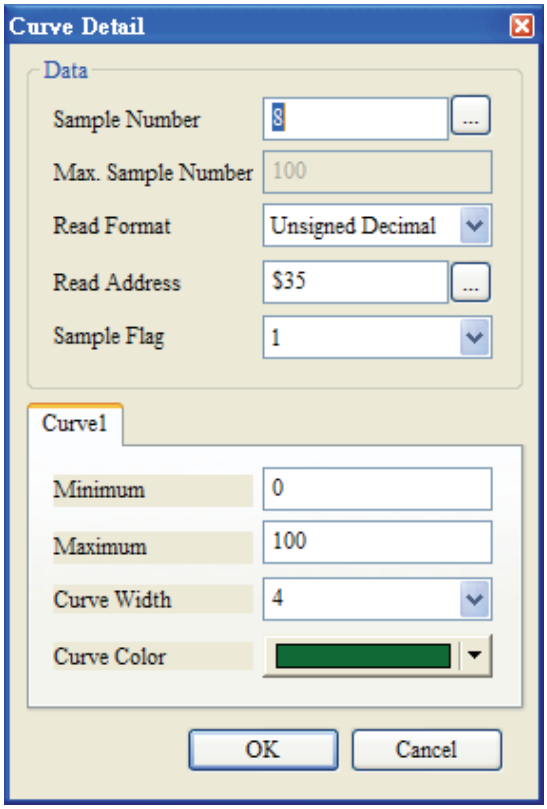
Property Description of X-Y Chart Element	
Grid Color	Please refer to the figure below. The grid color is set to red and the grid number in horizontal and vertical direction are both set to 2.
Horiz. Line Number	
Vert. Line Number	

Curve Element Example

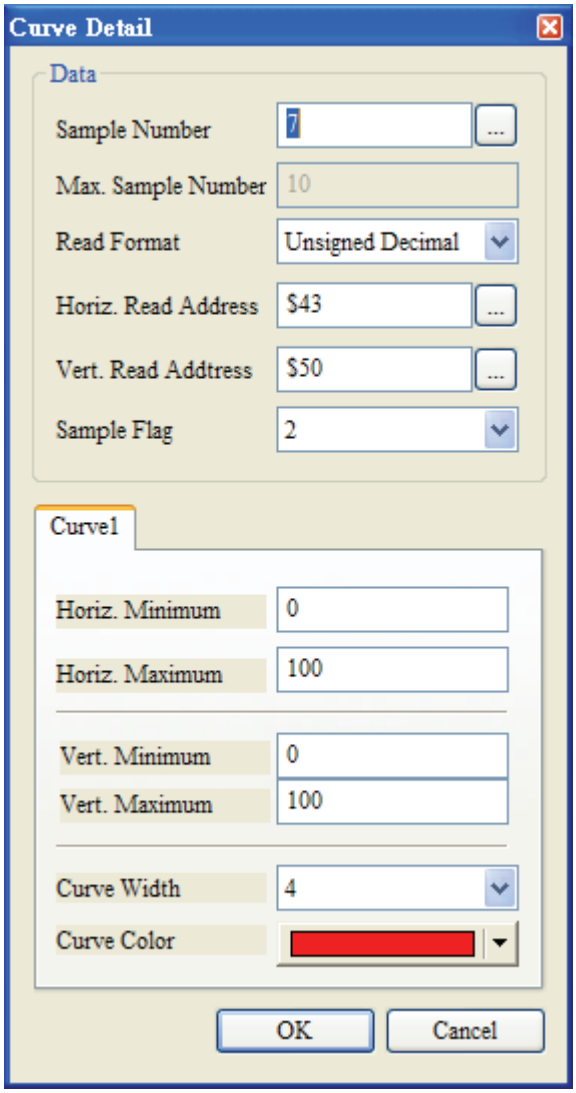
This curve element example can be downloaded via the following link:

http://59.120.64.39:81/phpbb2/files/curve.dop

1. Please choose **Options** > **Configuration** on the menu bar to find the Standard tab in Configuration dialog box and set the address of the control block as $1000.
2. Create a trend graph element. Set the Sample Flag to 1, Sample Number to 8, and Read Address to $35. Your Screen will look like the figure shown below.



3. Create a X-Y chart element. Set the Sample Flag to 2, Sample Number to 7, Horizontal Read Address to $43 and Vertical Read Address to $50. Your Screen will look like the figure shown on next page.



4. Then, the drawing flag of the trend graph, i.e. Trend Draw is $1002.0 and the clear flag of the trend graph, i.e. Trend Clear is $1002.8; the drawing flag of the X-Y chart, i.e. X-Y Draw is $1002.1 and the clear flag of the X-Y chart, i.e. X-Y Clear is $1002.9.
5. Create a momentary button, which the memory address is set to $1002.0 on the screen and set OFF macro as follows:

 CLRB $1002.8

 Create a momentary button, which the memory address is set to $1002.8 on the screen and set OFF macro as follows:

 CLRB $1002.0

 Create a momentary button, which the memory address is set to $1002.1 on the screen and set OFF macro as follows:

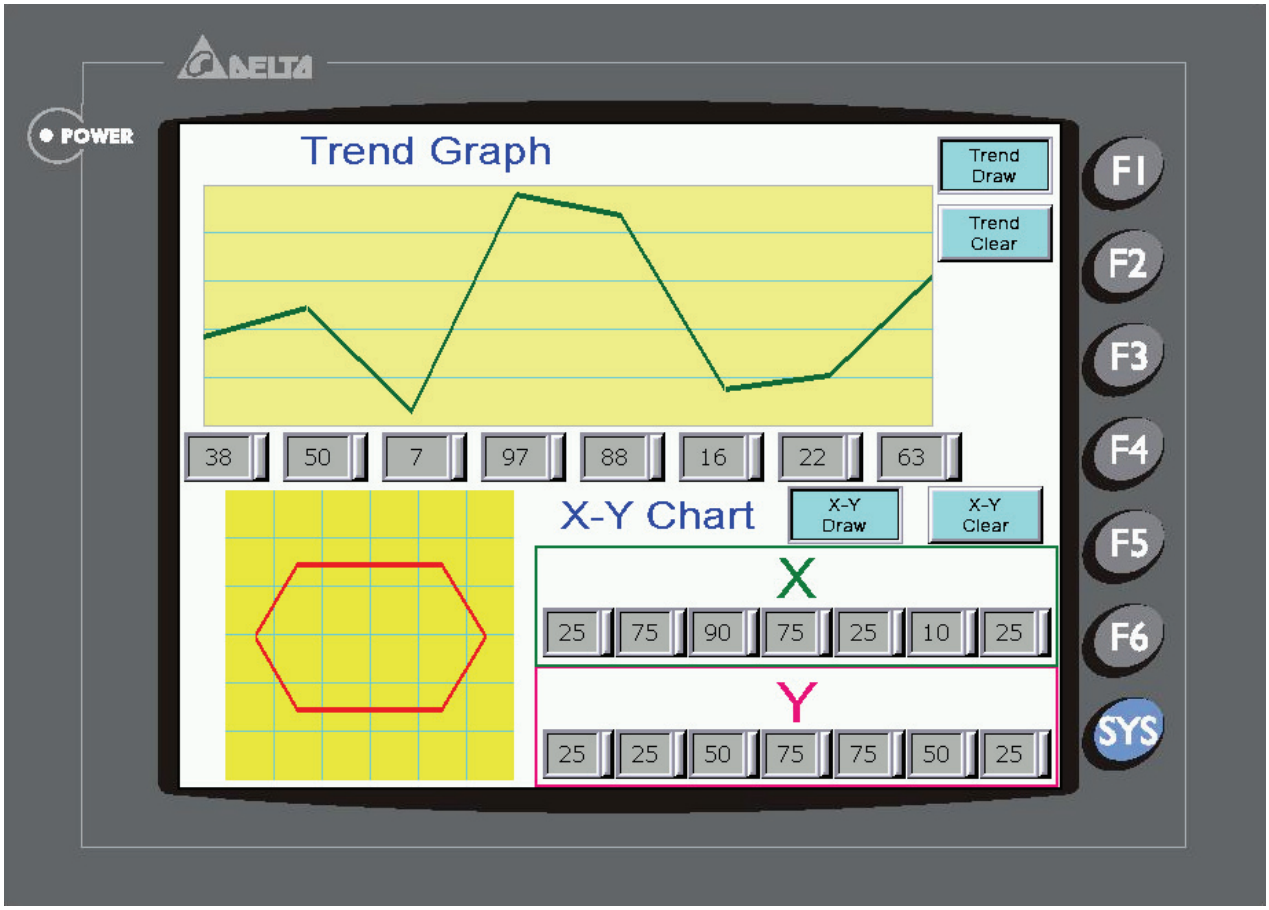
 CLRB $1002.9

 Create a momentary button, which the memory address is set to $1002.9 on the screen and set OFF macro as follows:

 CLRB $1002.1

6. Create numeric entry elements $35 ~ $56. After compile function is completed, execute the program. Then, input the value into the addresses from $35 to $42. When Trend Draw ($1002.0) is pressed, HMI will start to draw the trend graph. When Trend Clear($1002.8) is pressed, HMI will start to clear the trend graph.
7. $43 ~ $49 represent the X-axis data of the X-Y chart and $49 ~ $56 represent the Y-axis data of the X-Y chart. After the value of $43 ~ $56 is input, when X-Y Draw($1002.1) is pressed, HMI will start to draw X-Y chart; when X-Y Clear($1002.9) is pressed, HMI will start to clear X-Y chart.

Your Screen will look like the figure shown below.



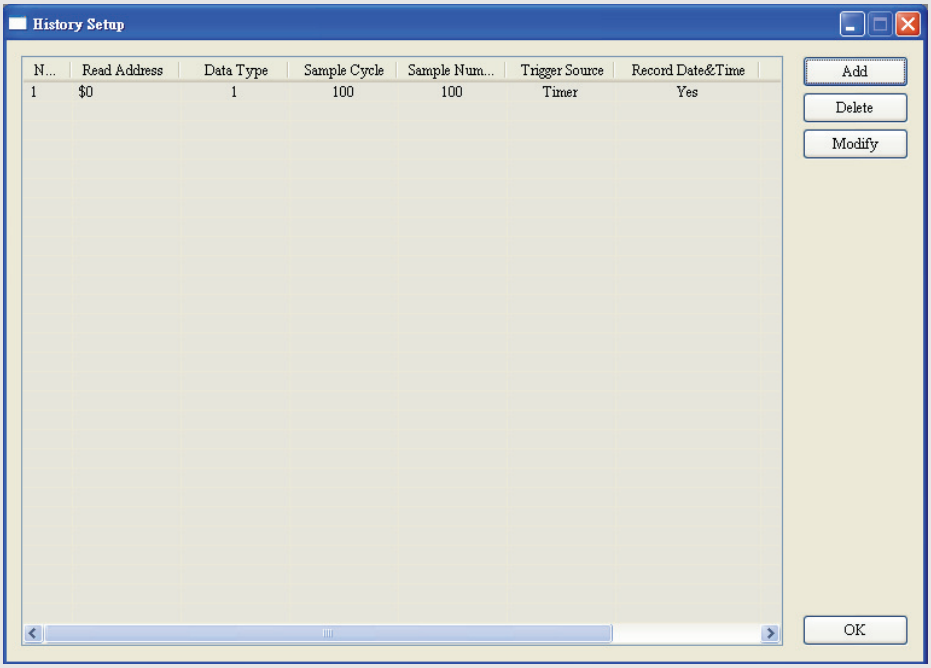
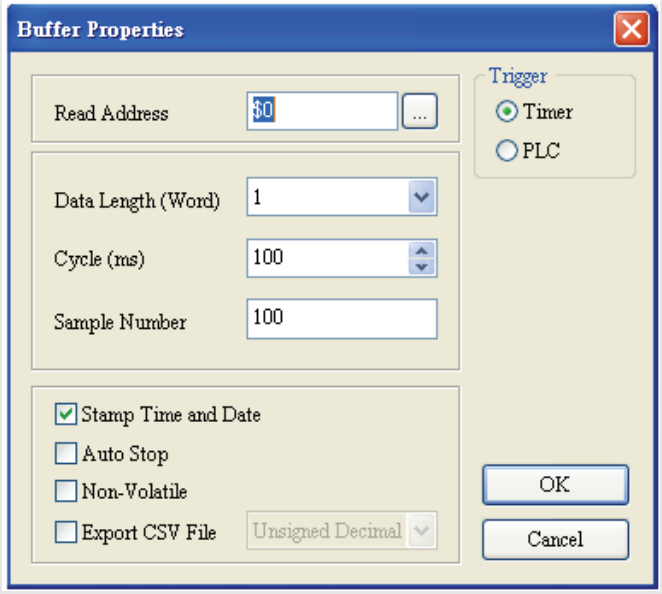
3.12 Sampling Element



Fig. 3.12.1 Sampling element options

The sampling element is designed to display the history data by history graph or table and can be updated immediately for the user to use and read more easily. Sampling elements should be used with History Setup. The user can click ”Option” > “History Setup” (Choosing History Setup command from menu bar) to execute this function.

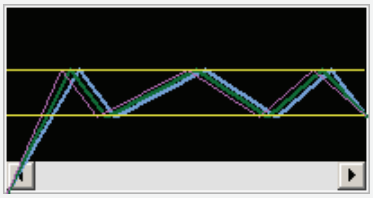
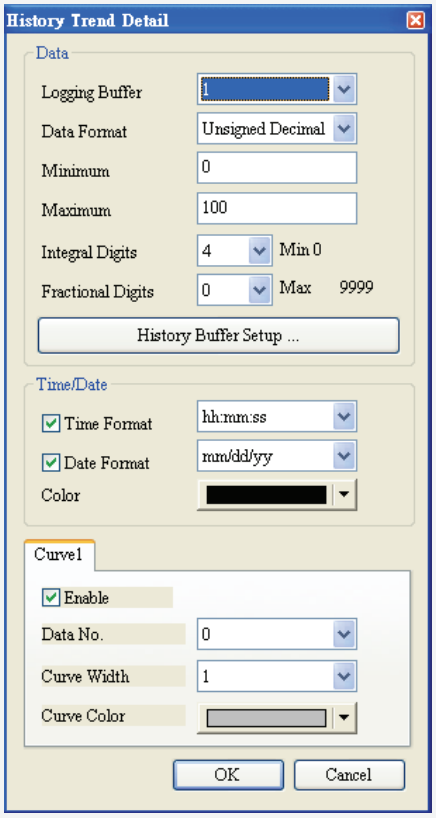
Table 3.12.1 History Setup Dialog Box

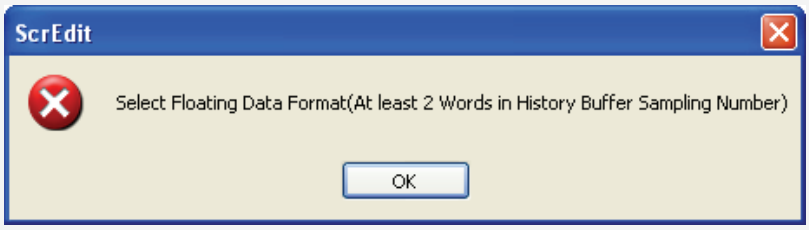
History Setup Dialog Box	
	
Add	Pressing Add button can add a history data. After the Add button is pressed, the following Buffer Properties dialog box will display. 

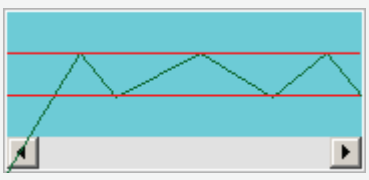
History Setup Dialog Box		
	Read Address	It is used to set the starting address for sampling the history data.
	Data Length (Word)	It is used to set how much words the user wants to sample. The range is within 1 ~ 13 continuous words. It indicates that max. 13 continuous words can be sampled. For example: If the setting value of Data Length is set to 6, it indicates that there are 6 continuous Words can be sampled.
	Cycle (ms)	It is used to set the sampling cycle time for reading address (how long it is to read address one time). If the Trigger option is PLC, this option will be ineffective and the sampling operation should be triggered by the control block flag. For the settings of the control block, please refer to Chapter 5.
	Sample Number	This option is used with the Auto Stop option. If the Auto Stop option is selected, HMI will stop recording the data after the numbers of records have reached the setting value of Sample Number option. If the Auto Stop option is not selected, when record number of data exceeds the setting value of Sample Number option, it will delete the records from the first record and insert the new record again. The record data will be name as “History.dat” and the user need to use the software, Data Access which is attached in HMI editing software, to open this file. Data Access will sort and list the history data by record time automatically.
	Stamp Time and Date	Use this option to determine if the time and date are also recorded during sampling operation.
	Auto Stop	Use this option to determine if HMI stop recording when the max. number of record data is reached.
	Non-Volatile	Using this option can enable HMI to save sampling data in SRAM. The capacity for saving history data of DOP-AS series is **120Kbytes**, DOP-A series is **240KBytes** and DOP-AE series is **360KBytes**. (In some HMI models, the user can save data in USB flash drive or SMC card and the capacity for saving history data depends on the capacity of USB flash drive or SMC card.)
	Export CSV File	The data can be exported to a CSV file for the user to read and edit more easily in the Windows@ Excel or other text editing tool. It allows the user to read max. 65536 rows and 256 columns of data in the Windows@ Excel environment. If the sample number of the sampling data exceeds 65536, when the user uses Windows@ Excel to open the CSV file, an error message will display. At this time, the user can use Notepad or other text editing tool to open the CSV file. If Auto Stop option is selected also, HMI will stop recording the data after the numbers of records have reached the setting value of Sample Number option. If Auto Stop option is not selected, when record number of data exceeds the setting value of Sample Number option, it will delete the records from the first record and insert the new record again. But, the data of the exported CSV file will not be sorted and listed by the record time.
	Trigger	There are Timer and PLC two options. It means that the sampling action is controlled by the Timer of the HMI or the external controller, i.e. PLC. When PLC option is selected, it indicates that the trigger bit designated by the register for sampling history buffer in the control block control the sampling action. Regarding the settings of the control block, please refer to Chapter 5.
	OK / Cancel	Press OK button to save the data and exit. Press Cancel to exit without saving data.
Delete	Pressing Delete button can delete a history data.	
Modify	Pressing Modify button can modify a history data.	

■ Historical Trend Graph

Table 3.12.2 Property Description of Historical Trend Graph Element

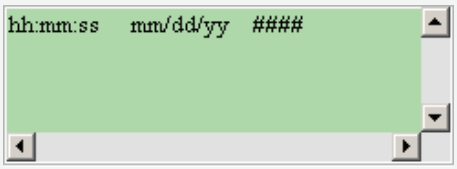
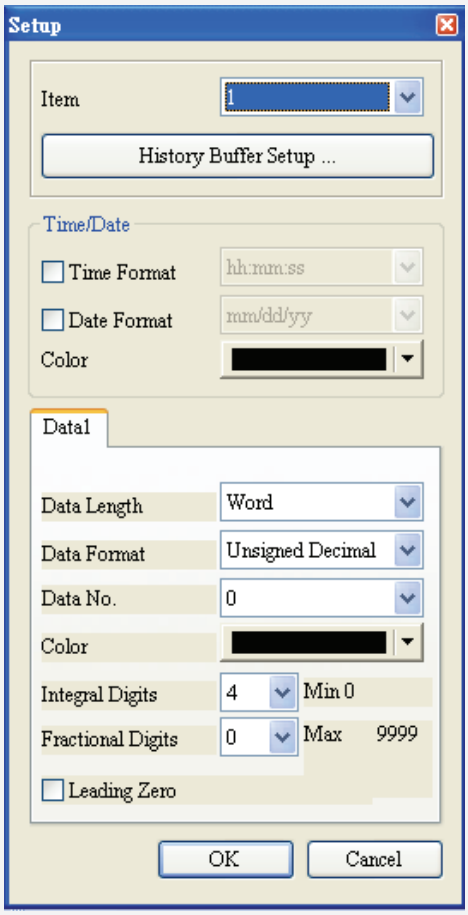
Property Description of Historical Trend Graph Element		
Convert the history data to trend graph with continuous curves and display on HMI screen.		
Border Color Background Color	The below element background color is set to black and its border color is set to gray. 	
Curve Number	1~8 curves can be set and displayed.	
Detail		
	Logging Buffer	Use this option to set the number (No.1 ~ No.X) of history buffer for reading the data of PLC corresponding address. The user can press the History Buffer Setup button or click ”Option” > “History Setup” (Choosing History Setup command from menu bar) to set the PLC corresponding address.
	Data Format	**Word** 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Floating

Property Description of Historical Trend Graph Element		
		Please note that if the data format is selected as "Floating", the Data Length option in the History Setup dialog box must be greater than or equal to 2words or the following warning message dialog box will display on the screen. 
	Minimum	It is used to set the minimum and maximum value of the display data, i.e. the minimum and maximum value of Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
	Maximum	

Property Description of Historical Trend Graph Element		
	Integral Digits	Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as "Floating".
	Fractional Digits	
	Time/Date	
	Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format	Provide **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY** three kinds of formats.
	Color	When time or date format is selected, the user can use this option to designate the display color.
	Enable	If this option is selected, the following curve options are enabled and can be set.
	Data No.	It is used to set the reading Word data when triggering every time. For example, if the Data Length option in the History Setup dialog box is set to 3words, there are 0 ~ 2 data numbers can be selected in this option. **Please note that if the data format is selected as "Floating", and the Data Length option in the History Setup dialog box is an odd numbers of words, ensure to set the Data No. as an even number.**
	Curve Width	It is used to the display curve width. The range is within 1 ~ 8 and the unit is pixel.
	Curve Color	It is used to the display curve color.
Grid Color	Please refer to the figure below. The grid color is set to red and the grid number in horizontal direction is set to 3. 	
Grid Number		

■ Historical Data Table

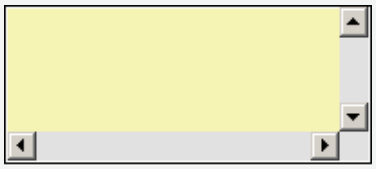
Table 3.12.3 Property Description of Historical Data Table Element

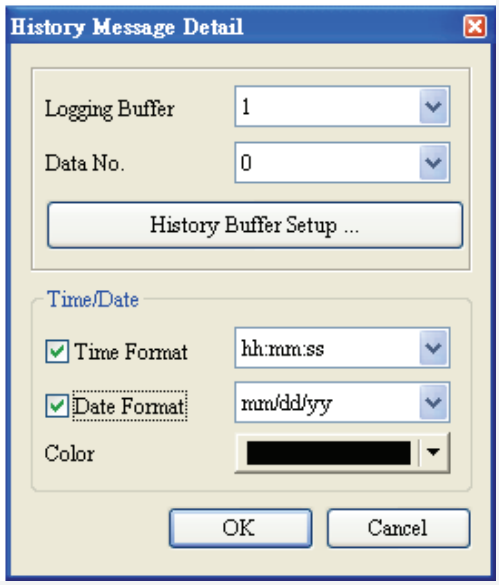
Property Description of Historical Data Table Element		
Convert the history data to numeric data and display on HMI screen by a data table. The read address in the History Setup dialog box needs to be set and its data length should be in several words. The range of data length is within 1 ~ 8words. The Data No. in History Data Detail dialog will also correspond to the selected Data Length in Buffer Properties of History Setup.		
Border Color Background Color	The below element background color is set to green and its border color is set to gray. 	
Data Field Number	1~8 data fields can be set.	
Detail		
	Logging Buffer	Use this option to set the number (No.1 ~ No.X) of history buffer for reading the data of PLC corresponding address. The user can press the History Buffer Setup button or click ”Option” > “History Setup” (Choosing History Setup command from menu bar) to set the PLC corresponding address.
	Time/Date	
	Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format	Provide **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY** three kinds of formats.
	Color	When time or date format is selected, the user can use this option to designate the display color.

<table>
<tr><th colspan="4">Property Description of Historical Data Table Element</th></tr>
<tr><td rowspan="6"></td><td>Date Length</td><td colspan="2">There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td rowspan="2">Data Format</td><td colspan="2">There are following data format provided:</td></tr>
<tr><td>Word</td><td>Double Word</td></tr>
<tr><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary</td><td>1. BCD
2. Signed BCD
3. Signed Decimal
4. Unsigned Decimal
5. Hex
6. Binary
7. Floating</td></tr>
<tr><td>Data No.</td><td colspan="2">It is used to set the reading Word data when triggering every time. For example, if the Data Length option in the History Setup dialog box is set to 3words, there are 0 ~ 2 data numbers can be selected in this option.
Please note that if the data format is selected as “Floating”, and the Data Length option in the History Setup dialog box is an odd numbers of words, ensure to set the Data No. as an even number.</td></tr>
<tr><td>Display Color</td><td colspan="2">It is used to the display data color.</td></tr>
<tr><td>Integral Digits</td><td colspan="2" rowspan="2">Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as “Floating”.</td></tr>
<tr><td>Fractional Digits</td></tr>
</table>

■ Historical Event Table

Table 3.12.4 Property Description of Historical Event Table Element

<table>
<tr><th colspan="3">Property Description of Historical Event Table Element</th></tr>
<tr><td colspan="3">Read the history data and display the corresponding text or character on HMI screen by an event table.</td></tr>
<tr><td>Text / Text Size
Font / Text Color</td><td colspan="2">The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)
It will show the input history message of every state. HMI system will list all input history messages in the event table. If there is no input history message, “?” will display.</td></tr>
<tr><td>Border Color
Background Color</td><td colspan="2">The below element background color is set to light yellow and its border color is set to black.
</td></tr>
<tr><td rowspan="2">Data Length</td><td>Word</td><td>It can have 256 states.</td></tr>
<tr><td>LSB</td><td>It can have 16 states.</td></tr>
<tr><td>Data Format</td><td colspan="2">This option can be set only when the data length is selected as Word. It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.</td></tr>
</table>

<table>
<tr><th colspan="3">Property Description of Historical Event Table Element</th></tr>
<tr><td>Add/Remove State</td><td colspan="2">It is used to set the state numbers of historical event table element. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.</td></tr>
<tr><td>Detail</td><td colspan="2">
</td></tr>
<tr><td></td><td>Logging Buffer</td><td>Use this option to set the number (No.1 ~ No.X) of history buffer for reading the data of PLC corresponding address. The user can press the History Buffer Setup button or click ”Option” > “History Setup” (Choosing History Setup command from menu bar) to set the PLC corresponding address.</td></tr>
<tr><td></td><td>Data No.</td><td>It is used to set the reading Word data when triggering every time. For example, if the Data Length option in the History Setup dialog box is set to 3words, there are 0 ~ 2 data numbers can be selected in this option.</td></tr>
<tr><td></td><td colspan="2">Time/Date</td></tr>
<tr><td></td><td>Time Format</td><td>Provide HH:MM:SS, HH:MM two kinds of formats.</td></tr>
<tr><td></td><td>Date Format</td><td>Provide MM/DD/YY, DD/MM/YY and DD.MM.YY three kinds of formats.</td></tr>
<tr><td></td><td>Color</td><td>When time or date format is selected, the user can use this option to designate the display color.</td></tr>
</table>

Sampling Element Example

This example is named as history.dop and it is saved in the Example folder under Screen Editor software installation directory.

In this example, we use Screen Cycle Macro to add up the value of $0, $1 and $2.

Then, set two groups of history data buffers. The read address is $0 and the data format is set to 3 (Signed Decimal) for one group and the read address is $2 and the data format is set to 1 (BCD) for the other group.

The display on HMI screen will be shown as the Fig. 3.12.2.

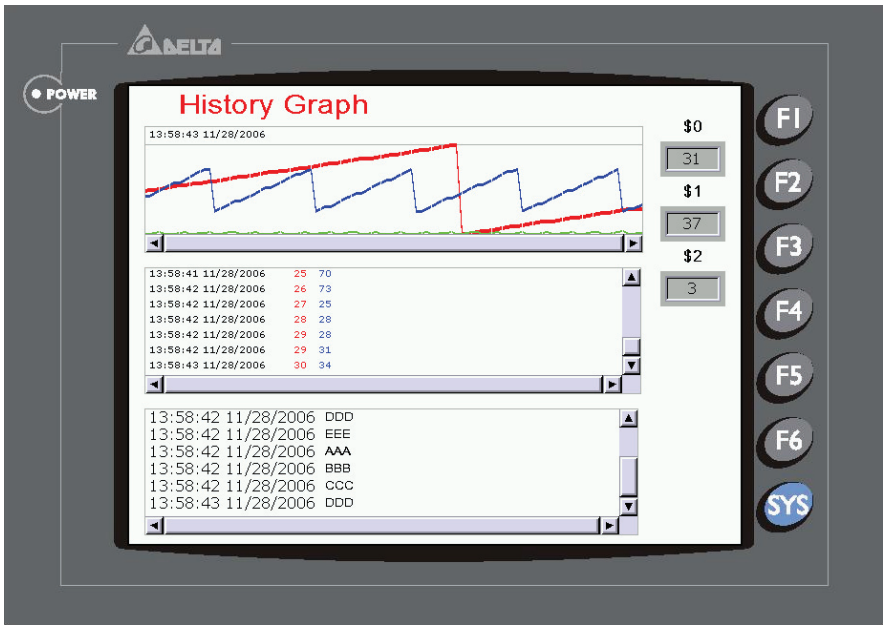


Fig. 3.12.2 History Graph

3.13 Alarm Element



Fig. 3.13.1 Alarm element options

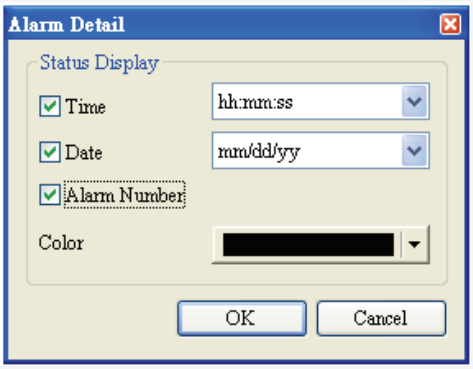
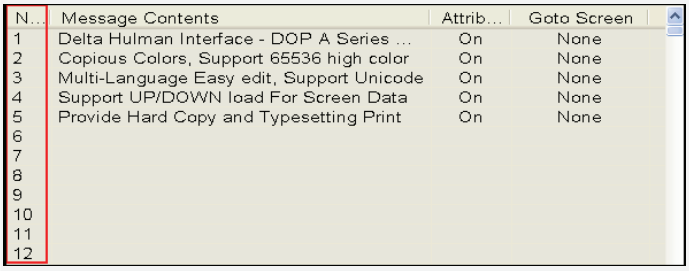
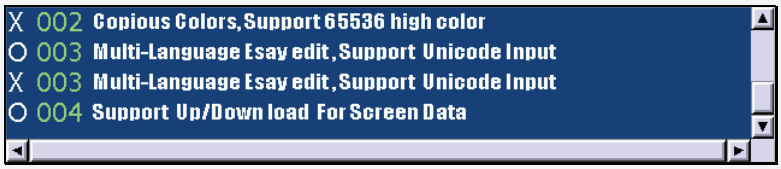
Table 3.13.1 Function of Alarm elements

Element Type	Icon	Function
Alarm History Table		HMI will monitor and read the read address in a fixed time automatically. If some certain Bit contact of the address is ON or OFF, the alarm message will be converted to Alarm History Table element and display on the screen.
Active Alarm List		HMI will only display the current alarm message by using Active Alarm List element on the screen.
Alarm Frequency Table		HMI will monitor and read the read address in a fixed time automatically. If some certain Bit contact of the address is ON or OFF, the ON or OFF frequency of the contact will be converted to Alarm Frequency Table element and display on the screen.
Alarm Moving Sign		HMI will monitor and read the read address in a fixed time automatically. If some certain Bit contact of the address is ON or OFF, the current alarm message will display on the screen via Alarm Moving Sign element.

■ Alarm History Table

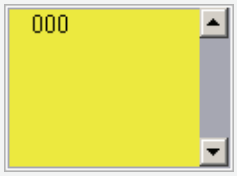
Table 3.13.2 Property Description of Alarm History Table Element

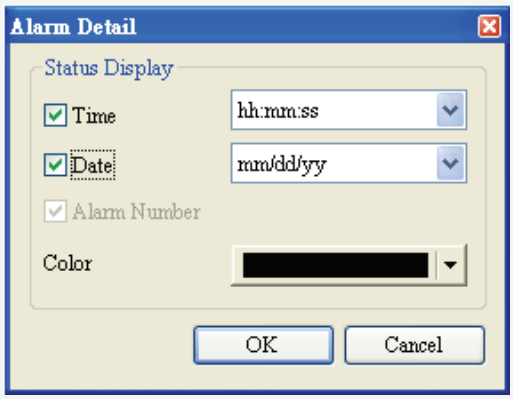
Property Description of Alarm History Table Element	
HMI will monitor and read the read address in a fixed time automatically. If some certain Bit contact of the address is ON or OFF, the alarm message will be converted to Alarm History Table element and display on the screen.	
Background Color	The background color of the following two elements is set to white and blackish green respectively.  The background color is set to white.  The background color is set to blackish green.

Property Description of Alarm History Table Element		
Detail		
	Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format	Provide **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY** three kinds of formats.
	Alarm Number	If this option is selected, when the alarm occurs, the alarm number that is designated in Alarm Setup dialog box will also be shown in front of the alarm message. Please refer to the figures below:  
	Color	When time or date format is selected, the user can use this option to designate the display color.

■ Active Alarm List

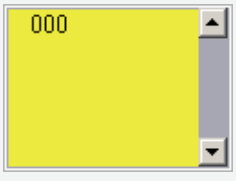
Table 3.13.3 Property Description of Active Alarm List Element

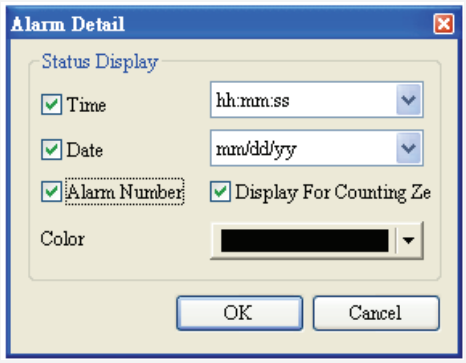
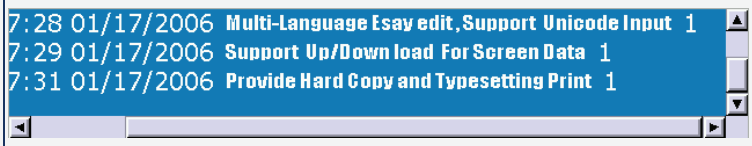
Property Description of Active Alarm List Element	
HMI will only display the current alarm message by using Active Alarm List element on the screen.	
Background	The background color of the following two elements is set to white and yellow respectively.  The background color is set to white.  The background color is set to yellow.

Property Description of Active Alarm List Element		
Detail		
	Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format	Provide **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY** three kinds of formats.
	Alarm Number	If this option is selected, when the alarm occurs, the alarm number for the alarm message will always be shown ahead. Please refer to the figures below: 
	Color	When Time and Date these two options are selected, the user can designate the display color by using this option.

■ Alarm Frequency Table

Table 3.13.4 Property Description of Alarm Frequency Table Element

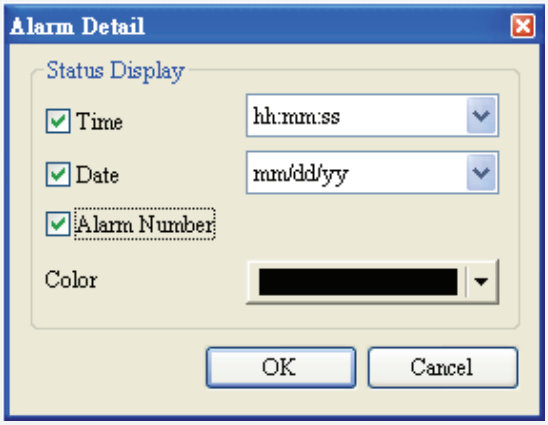
Property Description of Alarm Frequency Table Element	
HMI will monitor and read the read address in a fixed time automatically. If some certain Bit contact of the address is ON or OFF, the ON or OFF frequency of the contact will be converted to Alarm Frequency Table element and display on the screen.	
Background Color	The background color of the following two elements is set to white and yellow respectively.  The background color is set to white.  The background color is set to yellow.

Property Description of Alarm Frequency Table Element		
Detail		
	Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format	Provide **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY** three kinds of formats.
	Alarm Number	If this option is selected, when the alarm occurs, the time and date when the alarm occurred will also be shown in front of the alarm message. Please refer to the figure below: 
	Display for Counting Zero	Use this option to decide if show the message on the Alarm Frequency Table element or not when the occurring times of the alarm message is zero.
	Color	When Time and Date these two options are selected, the user can designate the display color by using this option.

■ Alarm Moving Sign

Table 3.13.5 Property Description of Alarm Moving Sign Element

Property Description of Alarm Moving Sign Element				
HMI will monitor and read the read address in a fixed time automatically. If some certain Bit contact of the address is ON or OFF, the current alarm message will display on the screen via Alarm Moving Sign element.				
Border Color Background Color	The background color of the element below is set to blue green and its border color is set to red. 			
Style	Standard	Raised	Sunken	Transparent
				
Moving Points	It is used to set the movement of the moving sign. The unit is Pixel and the range is within 1 ~ 50 Pixels.			
Interval(ms)	It is used to set the interval time between two movements. The unit is ms and the range is within 50 ~ 3000 ms.			

Property Description of Alarm Moving Sign Element		
Detail		
	Time	Provide HH:MM:SS and HH:MM two kinds of display format.
	Date	Provide MM/DD/YY, DD/MM/YY and DD.MM.YY three kinds of display format.
	Alarm Number	If this option is selected, when the alarm occurs, the alarm number that is designated in Alarm Setup dialog box will also be shown in front of the alarm message. Please refer to the figures below: 
	Color	When Time and Date these two options are selected, the user can designate the display color by using this option.

3.14 Graphic Element

Maybe the user needs some graphics that are not provided. Therefore, the following basic graphic elements are for the user to create their own graphs or drawings.

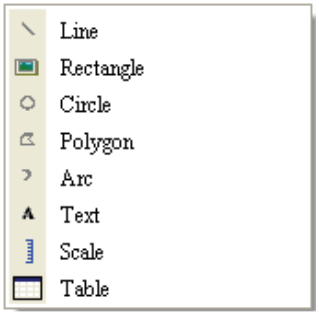
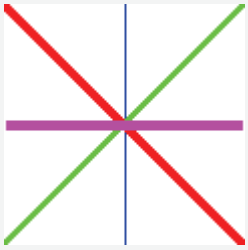
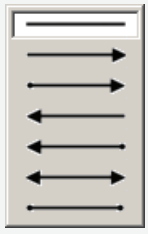


Fig. 3.14.1 Graphic element options

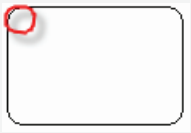
■ Line

Table 3.14.1 Property Description of Line Graphic Element

Property Description of Line Graphic Element	
Left-click the mouse to draw and edit the line graphic element. The user can click where the user wants to start the line and drag across the work place on the screen. Then, release the mouse to finish the line. When selecting this line graphic element, the user can see a rectangle range and this is designed for the user to move and adjust the line more quickly and conveniently. The user can set line color, size and style in property table freely. The range out of the line graphic element itself will be displayed in transparent color.  Line direction  Line width (1 to 8)	
Line Color	It is used to set the display color of the line element.
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Line Style	There are following line styles can be selected. 

■ Rectangle

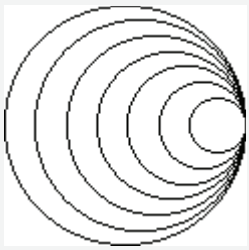
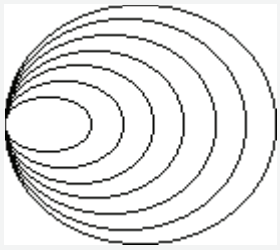
Table 3.14.2 Property Description of Rectangle Graphic Element

Property Description of Rectangle Graphic Element	
Left-click the mouse to draw and edit the rectangle graphic element. The user can drag the mouse across work place on the screen until the rectangle is the size that the user wants. Then, release the mouse to finish. The user can import the picture into the rectangle from picture bank and set rectangle color, size and style in property table.	
Line Color	It is used to set the display color of the rectangle element.
Picture Bank Name Picture Name	(Please refer to Table 3.2.2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3.2.2 Property Description of General Buttons.)
Foreground Color	It is used to set the display color of the rectangle graphic element.
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.
Round Radius	0~38 pixels round radius are provided for selection. 

■ Circle

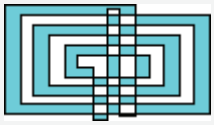
Table 3.14.3 Property Description of Circle Graphic Element

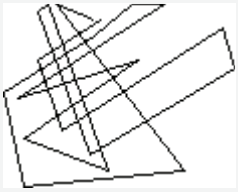
Property Description of Circle Graphic Element
The user can draw an ellipse or circle by using this option. The user can drag the mouse across work place on the screen until the ellipse or circle is the size that the user wants. Then, release the mouse to finish. If the width and height of the circle graphic element are the same size, the circle graphic element will be a round shape circle. If the width and height of the circle graphic element are not the same size, it will be an ellipse element. When selecting this circle graphic element, the user can see a rectangle range and this is designed for the user to move and adjust the circle more quickly and conveniently. Changing the size of the rectangle range is changing the size of circle graphic element directly. The range out of the circle graphic element itself will be displayed in transparent color. There is a “Transparent” option in the element property table. Once Yes is selected, the element will display only with the border and there is no color in the element. If there is any other element under this circle graphic element, it will show up and can be viewed on the screen.  An ellipse that its “Transparent” setting in the property table is set to “No”.

Property Description of Circle Graphic Element	
 An circle that its “Transparent” setting in the property table is set to “No”.  An circle that its “Transparent” setting in the property table is set to “Yes”.  An ellipse that its “Transparent” setting in the property table is set to “Yes”.	
Line Color	It is used to set the line color of the circle graphic element.
Foreground Color	It is used to set the display color of the circle graphic element.
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.

■ Polygon

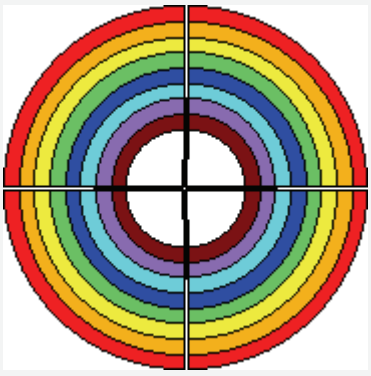
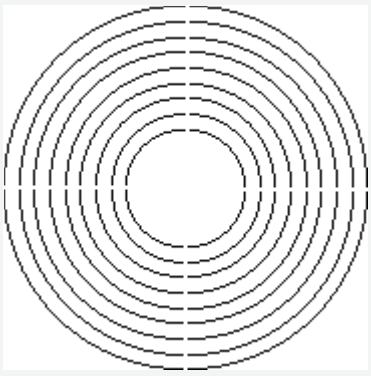
Table 3.14.4 Property Description of Polygon Graphic Element

Property Description of Polygon Graphic Element	
Left-click the mouse to determine each node of the polygon graphic element. The user can click where the user wants to place the first node and drag the mouse across work place on the screen until the next node is decided and left-click the mouse again to determine the position of the next node. Repeat the above action until the polygon is the size that the user wants. Then, right-click the mouse the mouse to finish. When selecting this polygon graphic element, the user can see a rectangle range and this is designed for the user to move and adjust the polygon more quickly and conveniently. Changing the size of the rectangle range is changing the size of circle graphic element directly. The range out of the circle graphic element itself will be displayed in transparent color. There is a “Transparent” option in the element property table. Once Yes is selected, the element will display only with the border and there is no color in the element. If there is any other element under this circle graphic element, it will show up and can be viewed on the screen.	
Line Color	It is used to set the line color of the polygon graphic element.
Foreground	It is used to set the display color of the polygon graphic element. Please refer to the figures below:  The foreground color is set to blue.  The foreground color is set to turquoise.

Property Description of Polygon Graphic Element	
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also. Please refer to the figures below:  A polygon that its “Transparent” setting in the property table is set to “No”.  A polygon that its “Transparent” setting in the property table is set to “Yes”.

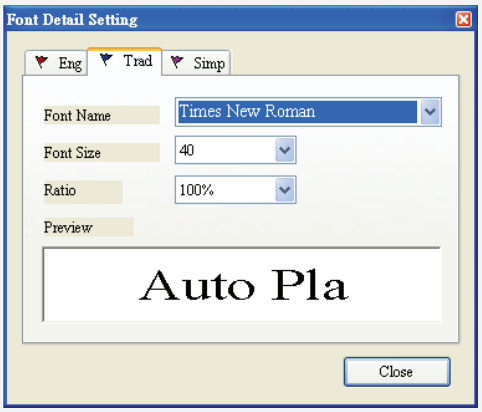
■ Arc

Table 3.14.5 Property Description of Arc Graphic Element

Property Description of Arc Graphic Element	
Left-click the mouse to draw and edit the arc graphic element. The user can click where the user wants to start the arc and drag across the work place on the screen. Then, release the mouse to finish the arc. When selecting this arc graphic element, the user can see a rectangle range and this is designed for the user to move and adjust the arc more quickly and conveniently. Changing the size of the rectangle range is changing the size of arc graphic element directly. There is a “Transparent” option in the element property table. If this option is set to Yes, it indicates that this element is an arc. If this option is set to No, it indicates that this element is a sector. The range out of the circle graphic element itself will be displayed in transparent color.  When “Transparent” is set to “No”  When “Transparent” is set to “Yes”.	
Line Color	It is used to set the line color of the arc graphic element.
Foreground Color	It is used to set the display color of the arc graphic element.
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.

■ Text

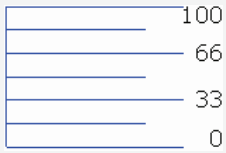
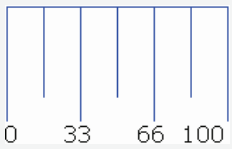
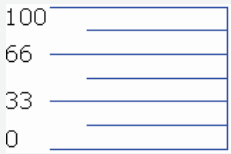
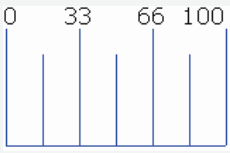
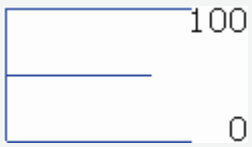
Table 3.14.6 Property Description of Text Graphic Element

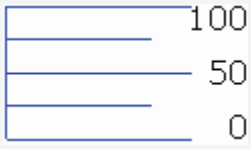
Property Description of Text Graphic Element	
This text graphic element is used to create a text frame, and add and edit the text on the screen. The user can drag the mouse across work place on the screen until the text frame is the size that the user wants and release the mouse to finish. Then, add and edit the text in the text frame. The foreground color is the color of the text frame.	
Text Text Size Font Text Color	The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. When the user press ... button next to "Font", the following "Font Detail Setting" dialog box will display.  In "Font Detail Setting" dialog box, the user can select Font Name, Font Size and Ratio of the text and view the text format from the Preview window in advance. If the multi-language function is used, the user can see different language tabs and edit different language font setting in "Font Detail Setting" dialog box. Please refer to the example figure above.
Foreground Color	It is used to set the text frame color. Please refer to the figure below. The foreground color of this text graphic element is set to blue. 
Transparent	When this option is selected, the element will display the text only and there is no color in the element. The Foreground Color option will be disabled also.

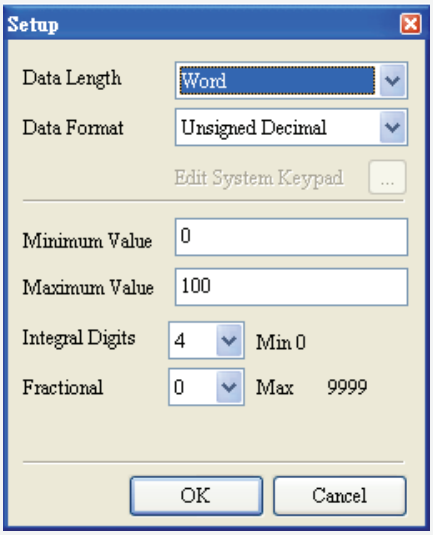
■ Scale

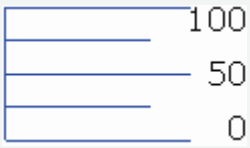
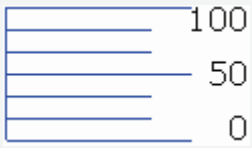
Table 3.14.7 Property Description of Scale Graphic Element

Property Description of Scale Graphic Element	
The user can change the scale direction, main and sub scale number, and grid color in the property table to create a special and unique scale graphic element. The "Display Mark" option can be used to determine if the scale value display next to the scale or not. The minimum and maximum of the scale value can be set in "Detail Setup" option.	
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~70 kinds of default text font for the user to use.

<table>
<tr><th colspan="4">Property Description of Scale Graphic Element</th></tr>
<tr><td>Style</td><td>Standard</td><td>Rotation 90</td><td>Rotation 180</td><td>Rotation 270</td></tr>
<tr><td></td><td>
</td><td>
</td><td>
</td><td>
</td></tr>
<tr><td>Main Scale</td><td colspan="4">Please refer to the figures below:


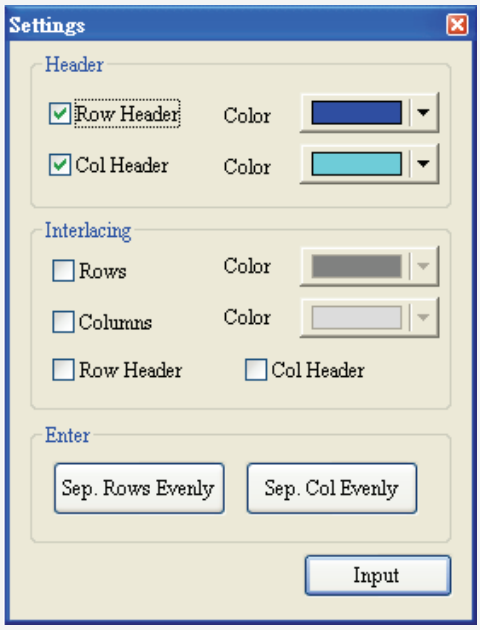
When main scale number is set to 2


When main scale number is set to 3</td></tr>
<tr><td>Display Mark</td><td colspan="4">It is used to determine if the scale value display next to the scale or not.</td></tr>
<tr><td>Detail Setup</td><td colspan="4">
</td></tr>
<tr><td></td><td>Date Length</td><td colspan="3">There are 16bits Word and 32bits Double Word two options.</td></tr>
<tr><td></td><td rowspan="2">Data Format</td><td colspan="3">There are following data format provided:</td></tr>
<tr><td></td><td colspan="3">Word/Double Word
1. BCD
2. Signed Decimal
3. Unsigned Decimal</td></tr>
<tr><td></td><td>Minimum</td><td colspan="3" rowspan="2">The user can set the minimum and maximum of input setting value to determine the range of input setting value.</td></tr>
<tr><td></td><td>Maximum</td></tr>
<tr><td></td><td>Integral Digits</td><td colspan="3" rowspan="2">Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as “Floating”.</td></tr>
<tr><td></td><td>Fractional Digits</td></tr>
<tr><td></td><td colspan="4">When the user have input the minimum and maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length, data format, integral and fractional digits.</td></tr>
<tr><td>Grid Color</td><td colspan="4">It is used to set the grid color of the scale graphic element.</td></tr>
</table>

Property Description of Scale Graphic Element	
SubScale Number	When the main scale number is set to 3 and the subscale number is also used, the scale graphic element will display as the figures below:  When subscale number is set to 1  When main scale number is set to 2

■ Table

Table 3.14.8 Property Description of Table Graphic Element

Property Description of Table Graphic Element			
The user can change the cell numbers of the table, appearance and color in the property table to create a special and unique table graphic element. If it is used with other elements, each element will display more completely on the screen.			
Background Color	It is used to set the display color of the table scale element.		
Detail Setup	 		
	Header	Row Header	It is used to the color of the first row of the table. The user can enable or disable this option by checking the check box next to “Row Header”.
		Col Header	It is used to the color of the first column of the table. The user can enable or disable this option by checking the check box next to “Col Header”.
	Interlacing	Rows	It is used to the color of the interlacing rows of the table. The user can enable or disable this option by checking the check box next to “Rows”.
		Columns	It is used to the color of the interlacing rows of the table. The user can enable or disable this option by checking the check box next to “Rows”.
		Row Header	It is used to the color of the interlacing row header of the table. The user can enable or disable this option by checking the check box next to “Row Header”.

Property Description of Table Graphic Element			
		Columns Header	It is used to the color of the interlacing column header of the table. The user can enable or disable this option by checking the check box next to “Columns Header”.
	Cell Setting	Sep. Rows Evenly	It is used to distribute rows of the table evenly.
		Sep. Col Evenly	It is used to distribute columns of the table evenly.
Border Color	It is used to set the border color of the table.		
Grid Color	It is used to set the grid color of the table.		
Number of Rows	The range is within 1 ~ 99.		
Number of Columns	The range is within 1 ~ 99.		

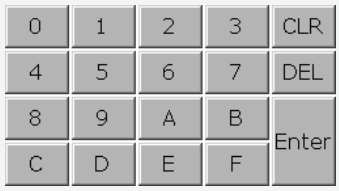
3.15 Keypad Element

Table 3.15.1 Property Description of Keypad Element

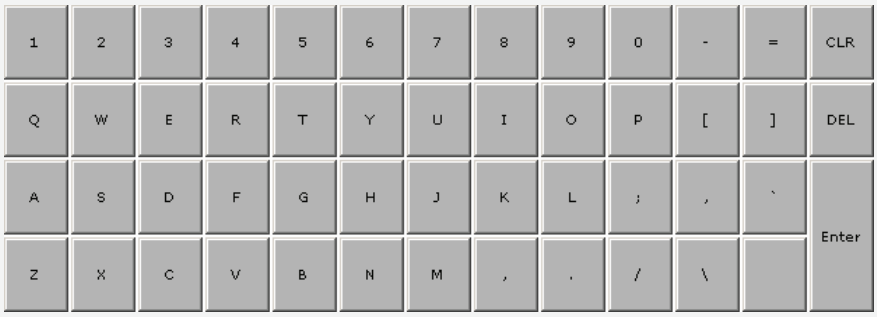
Property Description of Keypad (1) / (2) / (3) Element
Provide three kinds of default keypad elements for selection. The user can select decimal, hexadecimal or character these three kinds of keypad according to difference application requirement.



Keypad (1) Decimal Keypad

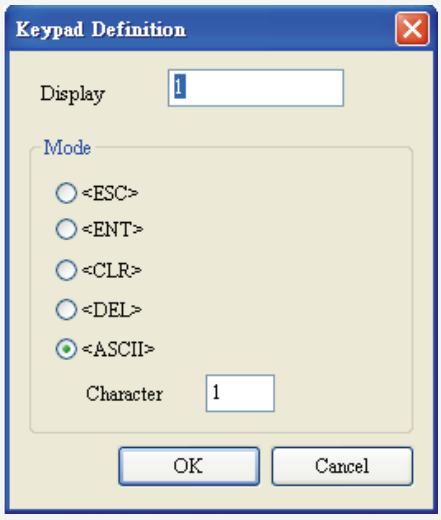


Keypad (2) Hexadecimal Keypad



Keypad (3) Character Keypad

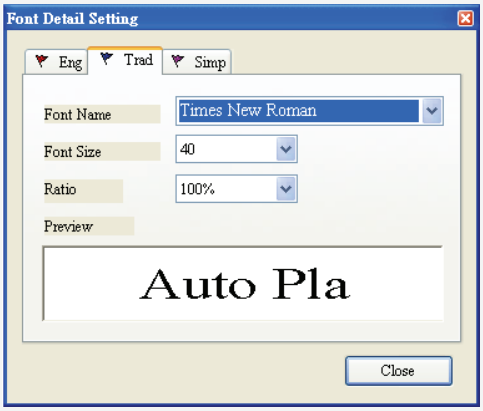
The user can redefine the display text of each button shown on the keypad. The other buttons, such as **<ESC>** (Escape), **<ENT>** (Enter), **<CLR>** (Clear), **<DEL>** (Delete) and **<ASCII>** (Input Character) can also be renamed flexibly. Please refer to the following figure below:



When the “Text” option is inputted as number “1”, the display text on the button will be “1”. If the user refines it as number “2”, the display text will be changed to “2”. If it is refined as character “A”, the display text will be changed to “A”. If it is changed to character “%“, the display text will be changed to “%” and vise versa.

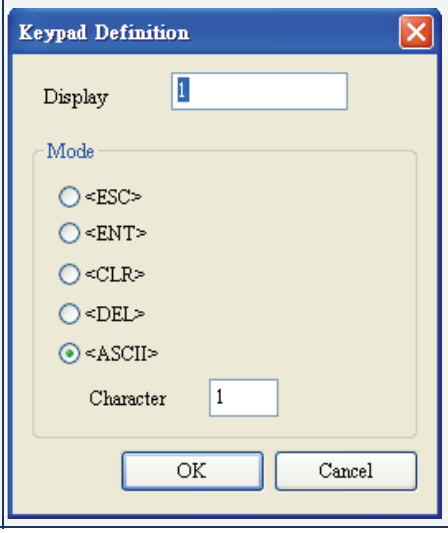
The keypad is displayed in a “Group” on the screen. The user can use “Ungroup” command from “Edit” menu bar to ungroup all the buttons. Then, the user move and change the button size freely. At this time, the user can redefine the display text shown on the button in the property table.

The keypad element should be used with the Numeric / Character Entry elements. For these two kinds of elements, the user has to set the Input Mode as “Active Non-Popup” and “Touch Non-Popup” and InterLock Address should be set also. Please refer to Table 3.10.2 & Table 3.10.3 for the property description of Numeric / Character Entry elements. (The difference between “Active Non-Popup” and “Touch Non-Popup” is that when InterLock Address is set, the element will twinkle automatically if its input mode is set to “Active Non-Popup”; however, when InterLock Address is set, if its input mode is set to “Touch Non-Popup”, the element will not twinkle until the user touches the element.)

<table>
<tr><th colspan="3">Property Description of Keypad (1) / (2) / (3) Element</th></tr>
<tr><td>Text
Text Size
Font
Text Color</td><td colspan="2">The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. When the user press ... button next to “Font”, the following “Font Detail Setting” dialog box will display.


In “Font Detail Setting” dialog box, the user can select Font Name, Font Size and Ratio of the text and view the text format from the Preview window in advance. If the multi-language function is used, the user can see different language tabs and edit different language font setting in “Font Detail Setting” dialog box. Please refer to the example figure above.</td></tr>
<tr><td>Picture Bank Name
Picture Name</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Transparent Effect
Transparent Color</td><td colspan="2">(Please refer to Table 3.2.2 Property Description of General Buttons.)</td></tr>
<tr><td>Foreground Color
Style</td><td colspan="2">There are Standard and Raised these two options.


(When the style is selected as Standard and the foreground color is set to green.)


(When the style is selected as Raised and the foreground color is set to red.)</td></tr>
<tr><td>Detail Setup</td><td colspan="2">The user can redefine the buttons of the keypad


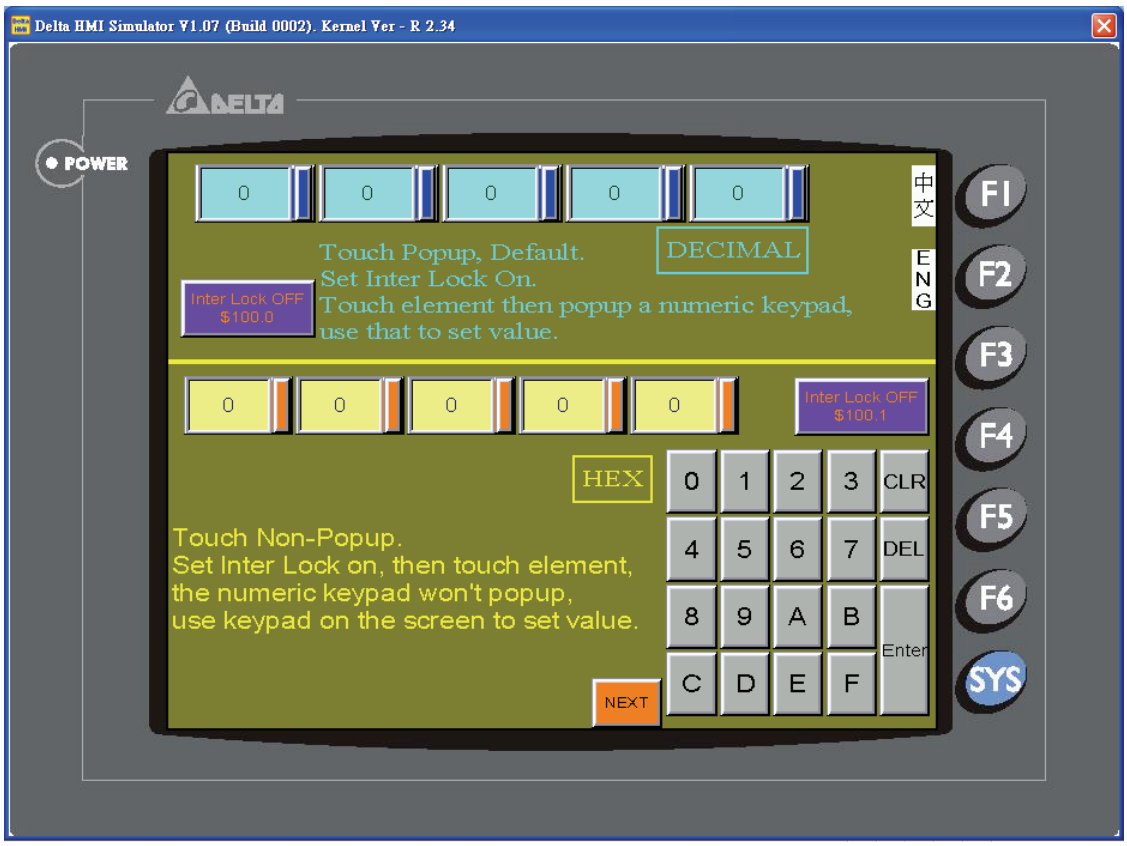
<table>
<tr><td>Display</td><td>Display text or character</td></tr>
<tr><td>Mode</td><td>The are following modes provided::
1. <ESC> Escape/Cancel (If the keypad is put on the sub window, this key can be used to close the sub window.
2. <ENT> Enter
3. <CLR> Clear
4. <DEL> Delete
5. <ASCII> Character</td></tr>
</table></td></tr>
</table>

Example for Keypad Element

This example can be downloaded via the following link:

http://59.120.64.39:81/phpbb2/files/keypad.dop

In this example, the user can use three different kinds of keypad elements.



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Chapter 4 Macro Function

Macro function provides various commands. When the HMI user works with macro commands on the HMI, it can reduce the PLC program editing efficiently. Therefore, Macro is a very convenient function for the HMI user to use. After editing Macro, the user can test the Macro validity via either on-line simulation or off-line simulation on the PC before downloading to HMI. The lines number for each macro is 512 lines and 128 words (max.) for writing comments or strings in a line. The sub-macro number is 512 sub-macros (number is 1-512). See Fig. 4.1 and Fig. 4.2.

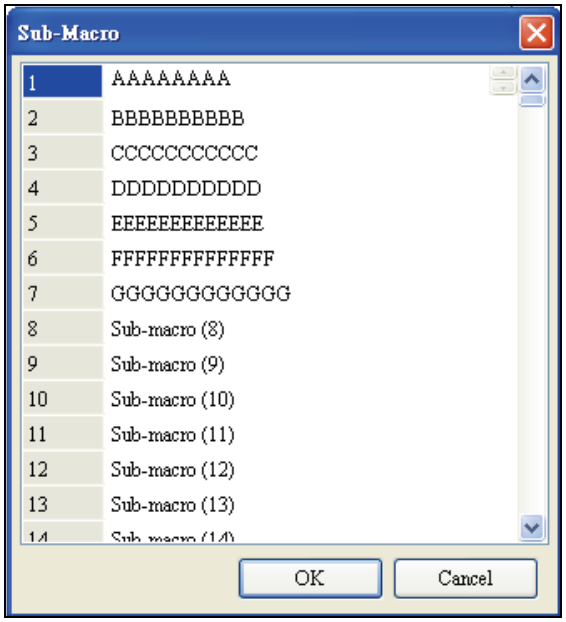


Fig. 4.1
The user can comment each macro by sub-macro function for the convenience of management, maintain and operation. The initial name of all sub-macro is Sub-macro (n) (n is from 1 to 512).

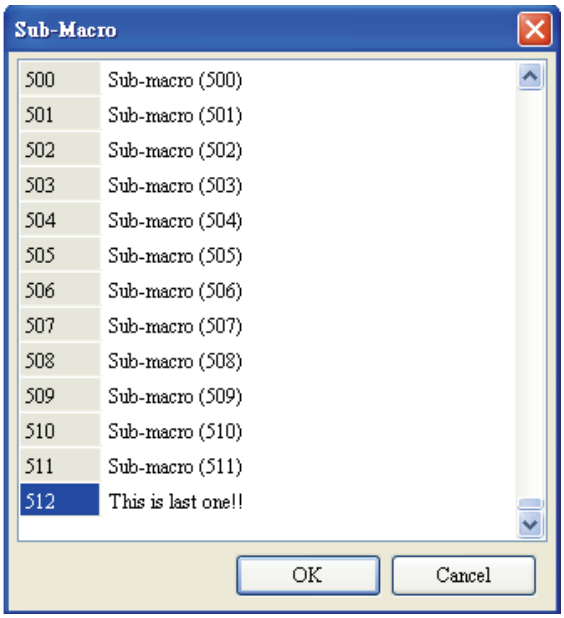


Fig. 4.2
The left-most field in the left window is sub-macro number. There are max. 512 sub-macros for editing. The user can use call command and write “CALL n” (n is from 1 to 512) to use sub-macro.

4.1 Macro Type

Delta DOP series HMI provides eleven kinds of macro commands and they are divided into four categories. Please refer to the following:

1. Element ON / OFF Macro: It is provided for each Bit element that can be input, such as button element, i.e. Maintained and Momentary button.
2. Before / After Execute Macro: It is provided for all elements, such as numeric / character entry element and all button elements (including system button).
3. Screen Open / Close / Cycle Macro: Use screen as a unit. Each screen has an individual screen macro.
4. Initial / Background / Clock / Sub Macro: Use system as a unit. Each project, i.e. each program, has its individual screen macro.

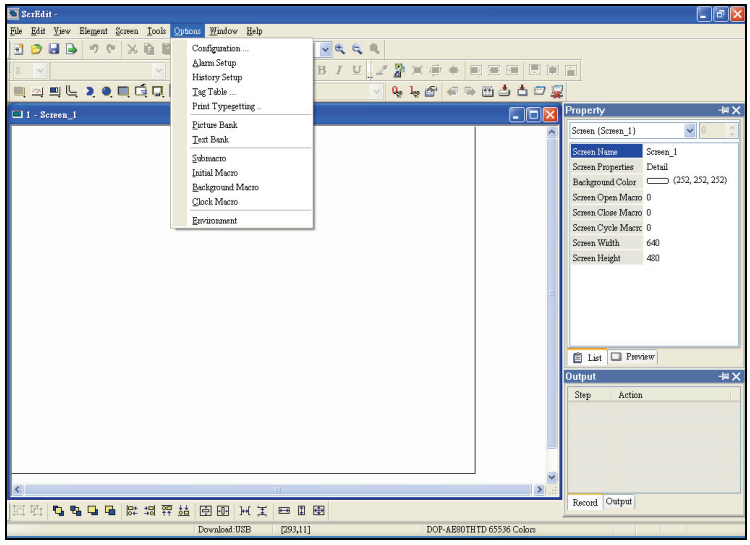


Fig. 4.1.1 Choosing Macro command from menu bar

Macro Name	Numbers	Remark
On Macro	1	The user can have an ON Macro for each specific button.
Off Macro	1	The user can have an OFF Macro for each specific button.
Before Execute Macro	1	For all button elements and numeric / character entry element. One element has one before execute macro.
After Execute Macro	1	For all button elements and numeric / character entry element. One element has one after execute macro.
Screen Open Macro	1	There is a screen open macro for each screen. Therefore, there are n screen open macros for n screen.
Screen Close Macro	1	There is a screen close macro for each screen. Therefore, there are n screen close macros for n screen.
Screen Cycle Macro	1	There is a screen cycle macro for each screen. Therefore, there are n screen cycle macros for n screen
Initial Macro	1	There is only an initial Macro in a program.
Background Macro	1	There is only an background Macro in a program.
Clock Macro	1	There is only an clock Macro in a program.
Sub-macro	512	There are only 512 sub-macros for a program.

Table 4.1.1 Macro command table

- **ON Macro**

 This macro is attached to a button element. The user can use ON Macro for each specific button (Bit). It is called ON Macro because this start Macro is set to ON via setting the button (Bit). When the button is set to be ON, ON Macro will be executed ONCE. After execution, this macro will not be executed until the button is set to be ON again. However, ON Macro only can be executed when the corresponding Bit for the button is triggered to be ON through the action of pressing the button, i.e. the Bit is set to be ON and the pressed button is ON also. ON Macro will not be executed if the Bit is set to be ON only.

- **OFF Macro**

 This macro is attached to a button element. The user can use OFF Macro for each specific button (Bit). Same as ON Macro, OFF Macro is started via setting this button. When the button is set to be OFF, OFF macro will be executed ONCE. After execution, this macro will not be executed until the button is set to be OFF again. However, OFF Macro only can be executed when the corresponding Bit for the button is triggered to be OFF through the action of pressing the button, i.e. the Bit is set to be OFF and the pressed button is OFF also. OFF Macro will not be executed if the Bit is set to be OFF only.

- **Before Execute Macro**

 This macro is attached to a button element or numeric / character entry element. One element has one before execute macro. For example, when using a button element, this macro will be executed first before executing the operation of the button element.

- **After Execute Macro**

 This macro is attached to a button element or numeric / character entry element. One element has one after execute macro. For example, when using a button element, this macro will be executed after the operation of the button element is executed.

- **Screen Open Macro**

 The user can use Screen Open Macro to open each screen. Each screen has a Screen Open Macro. Screen Open Macro will only be executed ONCE when the user open a screen or switch to a new screen. The screen elements will be displayed and executed after finishing executing Screen Open Macro.

- **Screen Close Macro**

 The user can use Screen Close Macro to close each screen. Each screen has a Screen Close Macro. Screen Close Macro will only be executed ONCE when the user close a screen or switch to a new screen. The same as Screen Open Macro, the screen elements on new screen will be displayed and executed after finishing executing Screen Close Macro.

■ Screen Cycle Macro

The user can use Screen Cycle Macro to cycle each screen. Each screen has a Screen Cycle Macro and it can be executed repeatedly for a specified period of cycle time. The user can set the Macro Cycle Delay Time, i.e. the delay time every time between the end and restart of Screen Cycle Macro in Screen Properties dialog box (See Fig. 4.1.2). The system default setting is 100ms.

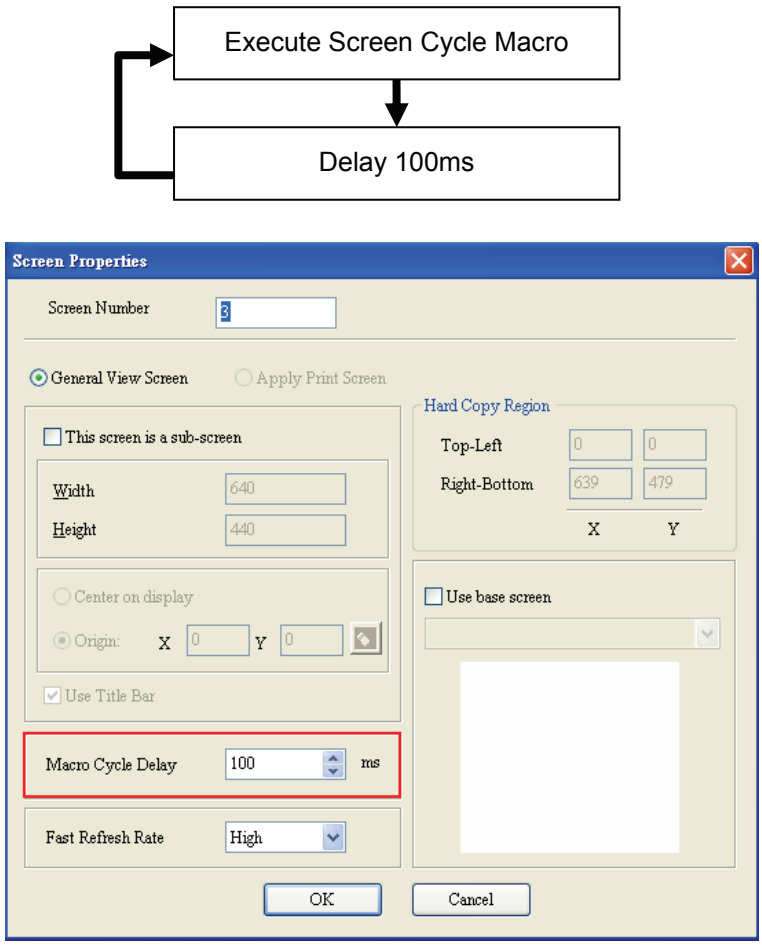


Fig. 4.1.2 Macro Cycle Delay Time Setting

■ Initial Macro

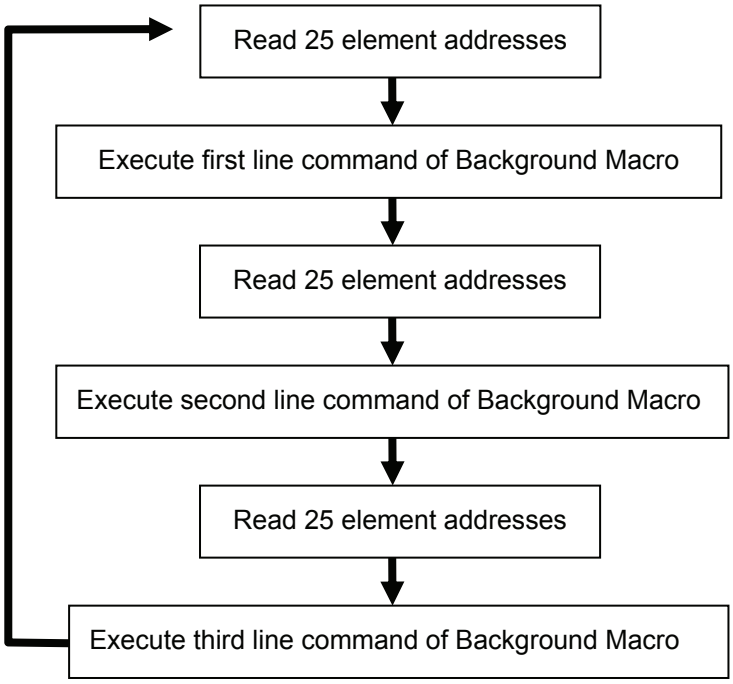
There is only one initial Macro in a program. It is executed first at the beginning of a program. So, the user can preset some necessary initial values in this macro to omit step-by-step settings and also control initial settings to avoid unexpected problem by an unknown initial value. If the user needs to setup any special setting in the PLC special address, the user can use initial macro to set it. It saves time with a well-designed initial macro.

■ Background Macro

There is only one background Macro in a program. It always exists in a program and is executed continuously like background during HMI operation. But the execution of a Background Macro is to execute one or more commands at a time, not finish the execution ONCE. After the last macro

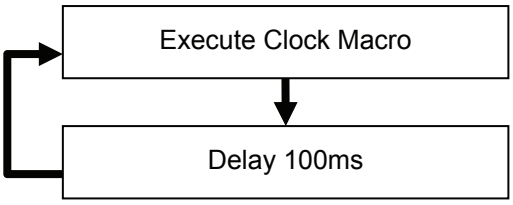
command is executed, system will start to execute this macro again from the first macro command. Since this macro works like this, if there is other executed Macro, such as cycle macro, it will not have any influences.

For example, suppose that there are 25 element addresses on the screen and Background is used (three lines of macro commands), when background macro is executed, HMI will first read 25 element addresses and then execute one line of background macro in order.



- **Clock Macro**

There is only an initial Macro in a program or a machine. Similar to Screen Cycle Macro, it can be executed repeatedly for a specified period of preset clock time. The user can set Clock Macro Delay Time, i.e. the delay time every time between the end and the restart of Clock Macro in Standard tab of Configuration dialog box (See Fig. 4.1.3). The system default setting is 100ms.



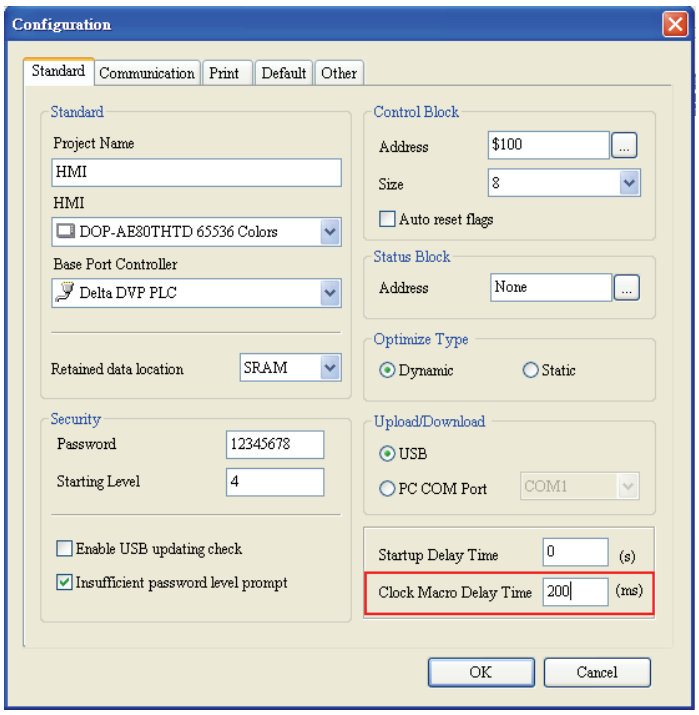


Fig. 4.1.3 Clock Macro Delay Time Setting

■ Sub-macro

There are 512 sub-macros for editing. Sub-macro is similar to the subroutine in the in program. The user can write repeated action or function in sub-macro to save macro editing time and easy maintain. That means the user can write a sub-macro to make it functions as a specific 10 sub-macros. For example, a function is written named sub-macro 1, the user only needs to write “CALL 1” in Macro whenever it is used. In this case, the user needs only modify this sub-macro instead of modifying 10 macros if necessary. The sub-macro can be named by its function for easy management.

NOTE

1) When editing any macros, please pay close attention to the logicality of macro command, especially the usage of loop and program. If the user write an infinite loop (i.e. program cannot be ended) in the macro or write a program which will not be executed until some certain condition is satisfied, it may make HMI work abnormally. Therefore, it is recommended that the user should use simulation function to verify the macro and check if HMI operation is correct or not after macro editing is completed.

4.2 Macro Editing

After choosing the desired Macro command from menu bar, the user can start editing Macro as shown as Fig. 4.2.1 below. The Macro command dialog box will pop up when  is clicked. For the user's convenience, the user can enter macro command in Marco Command Window or input macro command in Edit Window directly.

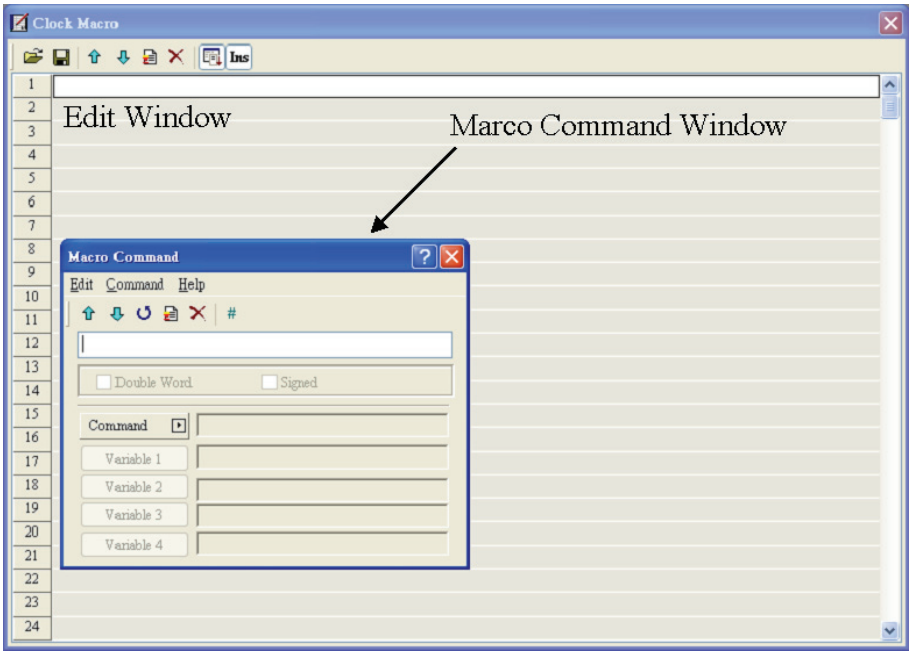


Fig. 4.2.1 Start editing Macro

The user can also use the icons on the toolbars (Fig. 4.2.2) for Macro editing.

Refer to Fig. 4.2.3, 512 lines (from 1 to 512) are available for editing Macro. Blank line in the program means that line will be set to comment line after updating as shown in Fig. 4-2-4.

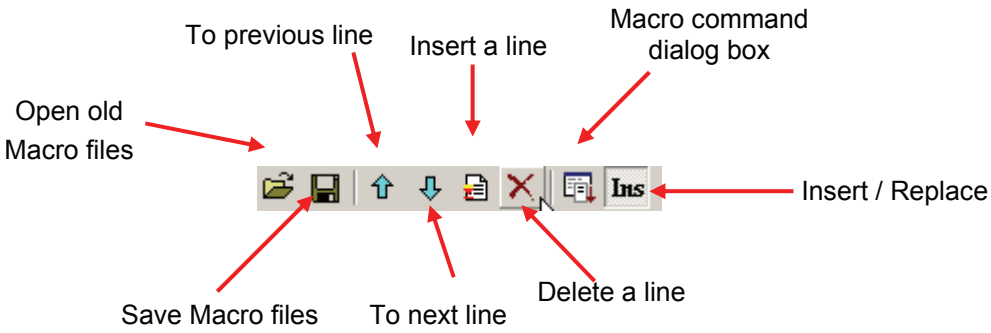


Fig. 4.2.2 Toolbar

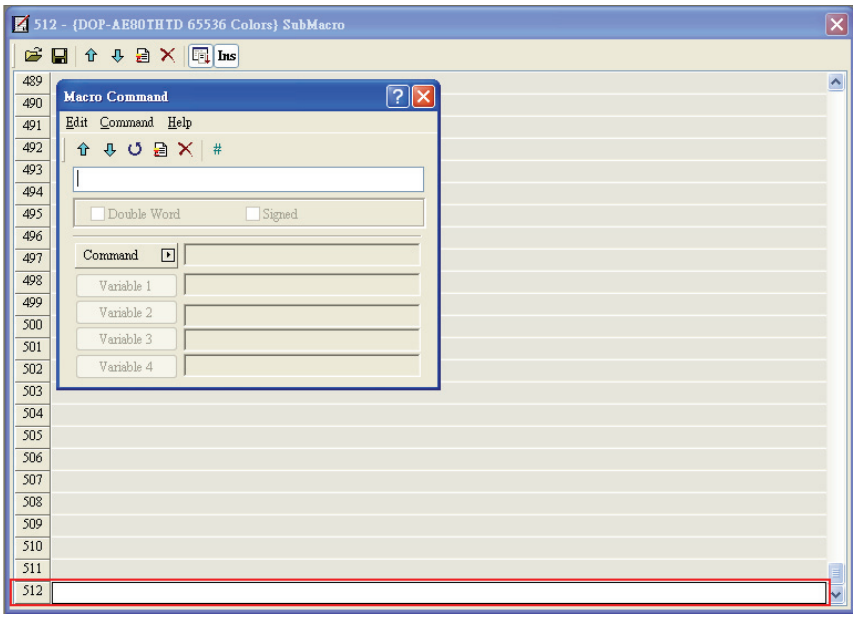


Fig. 4.2.3 Last line of Macro

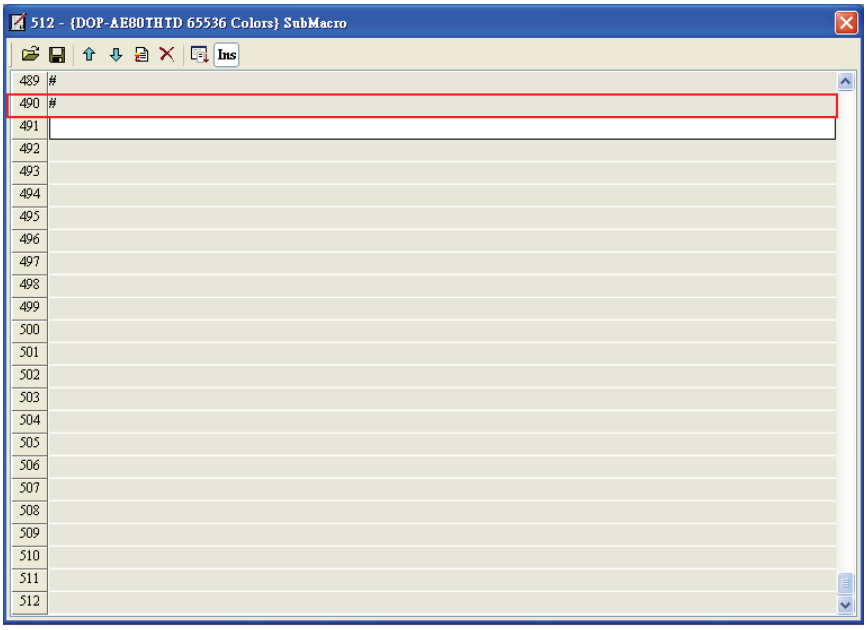


Fig. 4.2.4 Blank line becomes comment line

Once the editing Macro starts, the Macro command editing window will pop up (Fig. 4.2.5) by clicking .. The user can determine the command that the user needs by pressing the command button or clicking command from menu bar. Then, the user only needs to move the mouse cursor to the position of the command and all the commands will display. At this time, the user can start to edit Macro. Refer to the following sections for Macro editing methods.

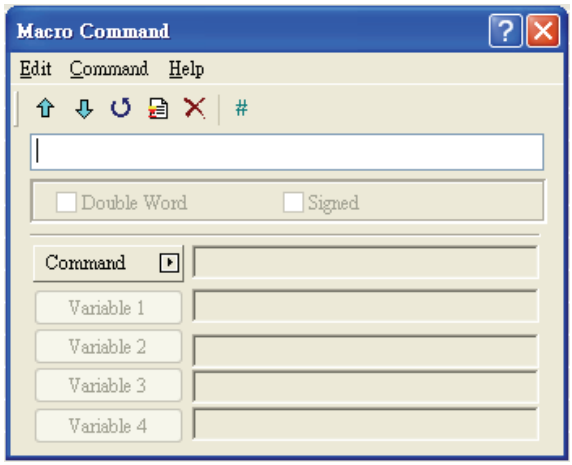


Fig. 4.2.5 Macro command editing window

■ File

■ Open Macro

ScrEdit provides open old macro function for the convenience of editing macro. The user can open old Macro files when using any PLC brand to save Macro editing time without re-input. Refer to Fig. 4.2.6 for Open Macro window.

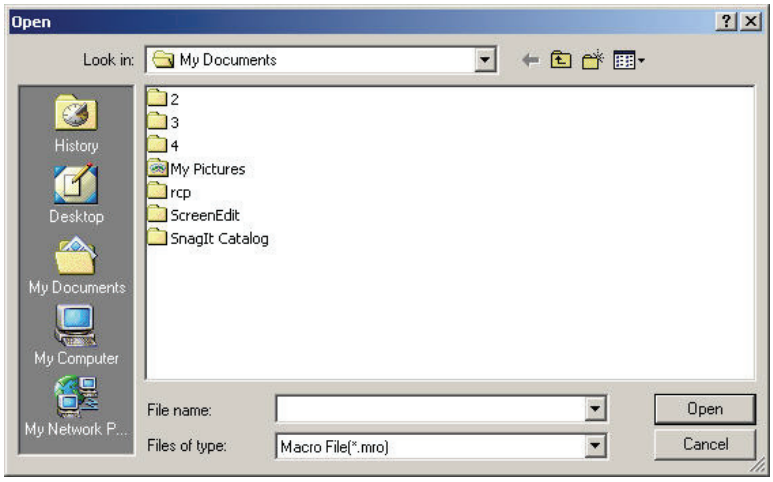


Fig. 4.2.6 Open Macro

■ Save As Macro

ScrEdit also provides “Save As” function for the user to modify old macro and save macro as other macro to backup or save re-input time of other macro commands.

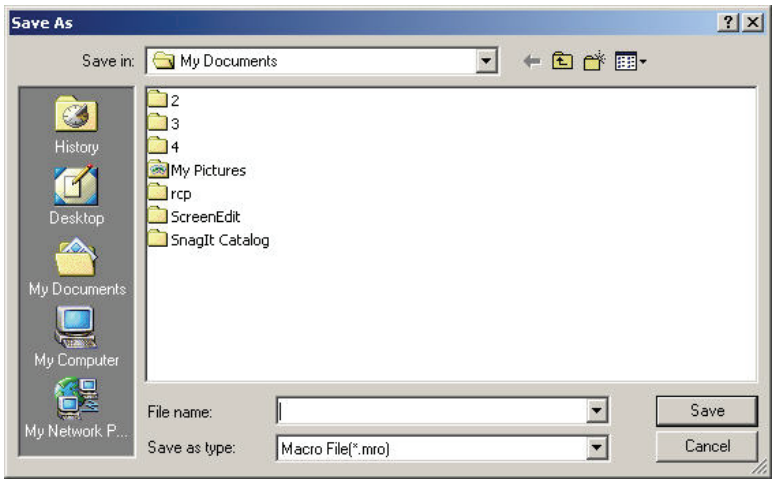


Fig. 4.2.7 Save As Macro

■ Copy One or More Macro Commands

In Macro Command Window, if the user does not want to copy the whole macro file and just need to modify parts of macro commands, we recommend the user to use this function. The user can select the row that the user desires to copy, press Ctrl key on the keypad and left-click the mouse to choose the desired macro commands (In the example figure below, one to five rows is chose) . After the desired macro commands are chose, the user can right-click the mouse on the cell in red color to select the Copy option (Fig. 4.2.8). Then, move the cursor to the destination, i.e. 16th row and right-click the mouse on the cell in red color to select the Paste option (Fig. 4.2.9) and copying macro commands is completed (Fig. 4.2.10). However, the function is not available when the user wants to copy macro commands in different programs. If copying macro commands in different programs is needed, the user must use Open Macro and Save As Macro function.

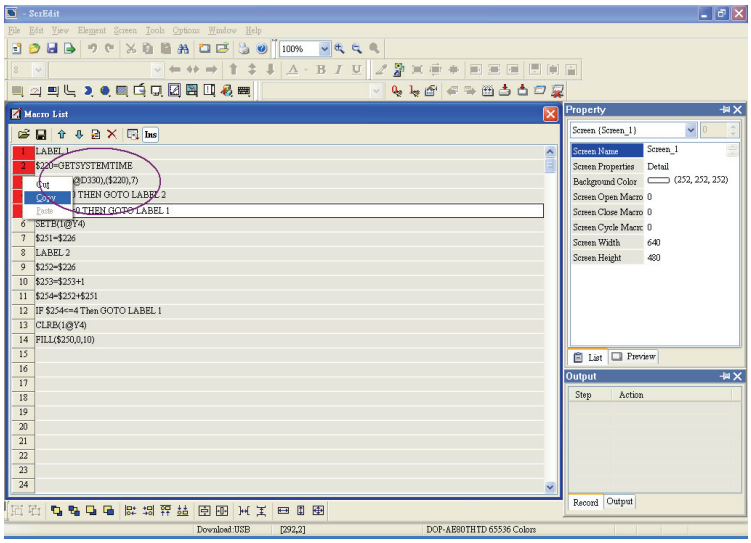


Fig. 4.2.8 Copy one or more macro commands

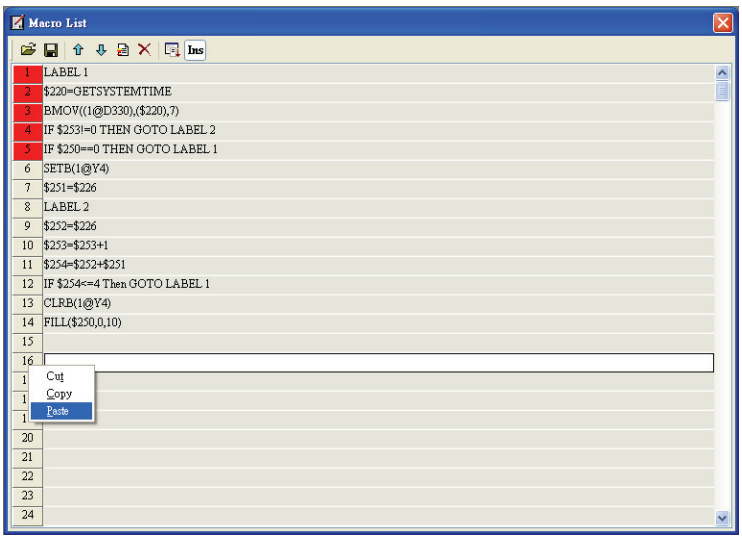


Fig. 4.2.9 Paste one or more macro commands

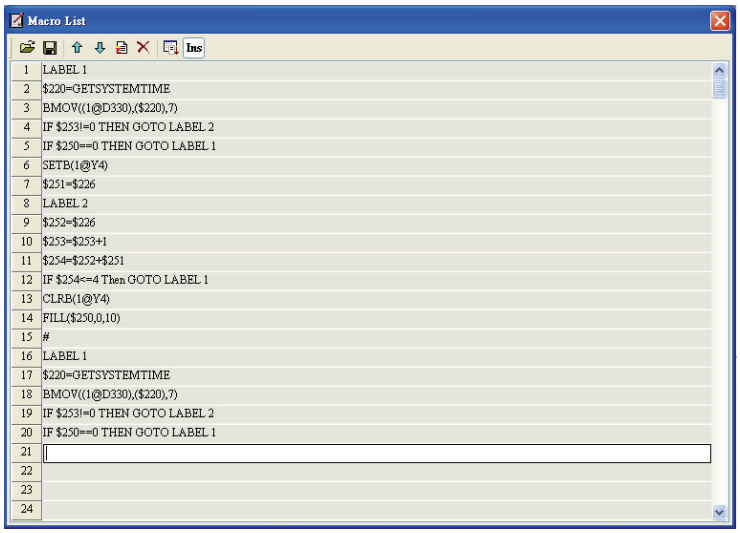


Fig. 4.2.10 The result of copying and pasting one or more macro commands

■ Edit

The user can edit Macro via Edit option in Macro Command dialog box (Fig. 4.2.11) or from toolbar (Fig. 4.2.12).

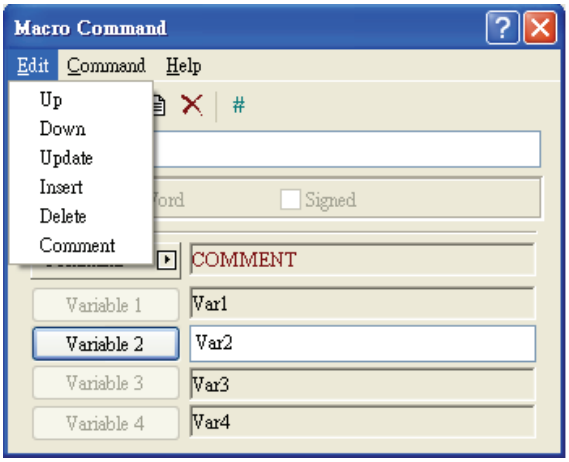


Fig. 4.2.11 Edit option in Macro Command dialog box



Fig. 4.2.12 Edit option from toolbar

- **Previous**



Move the selected line to the upper line of macro and the upper line of macro will move backward a line.

- **Next**



Move the selected line to the lower line of macro and the lower line of macro will move forward a line.

- **Update**



Update the current line of macro. The modification will not be updated if “update” is not pressed after editing. This gives user a second chance to decide to modify or not. Therefore, if the user forgets to update after editing, the user should re-do again.

- **Insert**



Insert the editing macro between two lines of macro. After inserting a new line, the existing line of macro will move backward a line.

- **Delete**



Delete the selected line. Lines after the delete line will be pushed upward after delete.

- **Comment**



Any comments or equations can be given for any lines to read/modify macro easily. The content of the comments will not be executed via HMI.
The user can choose and enter the desired text, characters or any symbols, or press # from toolbar to add a # symbol before an equation.

- **Command**

The user can edit the macro and enter equation directly by doubling-click the macro commands or use Command option in Macro Command dialog box (Fig. 4.2.13). For the detailed options of Command, please see Fig. 4.2.13 to Fig. 4.2.23.

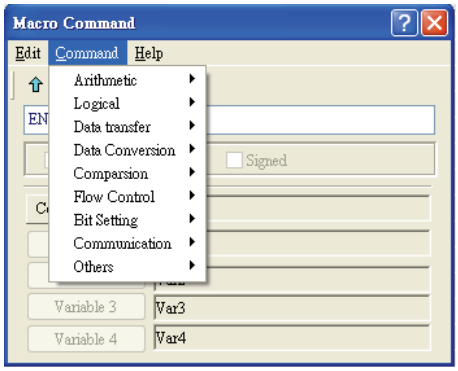


Fig. 4.2.13 Command option in Macro Command dialog box

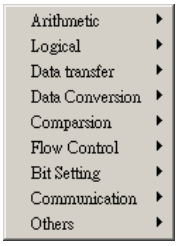


Fig. 4.2.14
Commands options

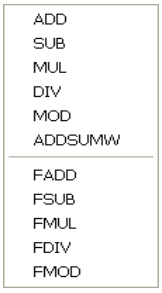


Fig. 4.2.15
Arithmetic

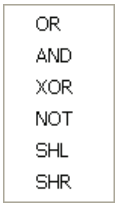


Fig. 4.2.16
Logical



Fig. 4.2.17
Data transfer

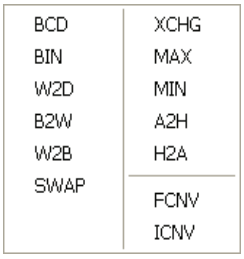


Fig. 4.2.18
Data conversion

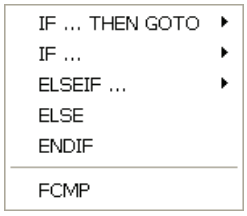


Fig. 4.2.19
Comparison

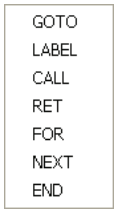


Fig. 4.2.20
Flow control



Fig. 4.2.21
Bit setting



Fig. 4.2.22
Communication



Fig. 4.2.23
Others

■ Keypad

For the convenience of editing macro, ScrEdit allows the user to edit Macro by using keypad (key in manually). ScrEdit will check the validity automatically. If there are any errors, a warning dialog box will pop up to remind the user. There are no limit spaces between operand and operation symbol for the user to key in. After finishing inputting, ScrEdit will convert the macro to the best format automatically after updating the macro or pressing Enter key. But please notice that ScrEdit has not verified the macro yet at this time.

4.3 Macro Operation

■ **Definition**

WORD 16 Bit data (It is made up of continuous 2 bytes, i.e. 16 bits, b15~b0. It can be used to represent 0000~FFFF of hexadecimal system.

DWORD, DW 32 Bit data (It is made up of continuous 2 words, i.e. 32 bits, b31~b0. It can be used to represent 00000000~FFFFFFFF of hexadecimal.)

BYTE 8 Bit data (It is made up of continuous 2 nibbles, i.e. 8 bits, b7~b0. It can be used to represent 00~FF of hexadecimal system.)

Signed A signed value is a numeric value with polarity. It means that the value is interpreted as essentially the 'plus' sign that can be found in front of a positive number and the 'minus' sign that can be found in front of a negative number.

If DW shows after the macro command, it indicates that the command is 32 Bit data, if DW doesn't display, it indicates that the command is 16 Bit data. When the user set the format of the device as Double Word, there will be two registers used actually. It means that if the user set the format of $0 as Double Word, $0 and $1 will be used for storing data.

If Signed shows after the macro command, it indicates that the command is a numeric value with polarity. If Signed doesn't display, it indicates that it is a numeric value without polarity.

$10 = $13 + $15	16 Bit data operation, no polarity
$0 = $2 + $4 (DW)	32 Bit data operation, no polarity
$4 = FADD($4, 1.9) (Signed DW)	32 Bit data operation, with polarity

■ **Arithmetic Operation**

Arithmetic Operation divides into three parts: Integer Operation, Floating Point Operation and Trigonometric Function Operation.

Each operand can be internal memory or constant. But it shall be internal memory only when outputting. Please refer to following table 4.3.1 and examples below for more information.

Command		Equation	Description	Remark
Integer Operation	+	***V1=V2 + V2***	Addition	The calculation result can be stored as signed or unsigned WORD and DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded. V1 can be internal memory only. V2 and V3 can be internal memory or constant.
	-	***V1=V2 - V3***	Subtraction	
	*	***V1 = V2 * V3***	Multiplication	
	/	***V1 = V2 / V3***	Division	
	%	***V1 = V2 % V3***	Get Remainder	

Command		Equation	Description	Remark
Floating Point Operation	FADD	***V1*=FADD(*V2*, *V3*)**	Addition	Floating Point Operation is the operation of signed 32 Bit data. V1 can be internal memory only. V2 and V3 can be internal memory or constant.
	FSUB	***V1*=FSUB(*V2*, *V3*)**	Subtraction	
	FMUL	***V1*=FMUL(*V2*, *V3*)**	Multiplication	
	FDIV	***V1*=FDIV(*V2*, *V3*)**	Division	
	FMOD	***V1*=FMOD(*V2*, *V3*)**	Get Remainder	
Trigonometric Function Operation	SIN	***Var1 = SIN (Var2)***	Sine Function	Trigonometric Function Operation is the operation of signed 32 Bit data. V1 can be internal memory only. V2 and V3 can be internal memory or constant.
	COS	***Var1 = COS (Var2)***	Cosine Function	
	TAN	***Var1 = TAN (Var2)***	Tangent Function	
	COT	***Var1 = COT (Var2)***	Cotangent Function	
	SEC	***Var1 = SEC (Var2)***	Secant Function	
	CSC	***Var1 = CSC (Var2)***	Cosecant Function	

Table 4.3.1 Arithmetic command table

■ **+, FADD**

Addition

Equation: *V1* = *V2* + *V3*

***V1* = FADD(*V2*, *V3*) (Signed DW)**

Perform the addition on V2 and V3, and store the addition result in V1.

Example:

The value contained within the internal memory address #2 plus 1

$2 = $2 + 1

The values contained within the internal memory address #1 and #2 are combined and the total is stored in the address #3.

$3 = $2 + $1

The value contained within the internal memory address #4 plus 1.9

$4 = FADD($4, 1.9) (Signed DW)

The floating point values contained within the internal memory address #4 and #6 are combined and the total is stored in the address #8.

$8 = FADD($4, $6) (Signed DW)

■ **-, FSUB**

Subtraction

Equation: V1 = V2 - V3

V1 = FSUB(V2, V3) (Signed DW)

Perform the subtraction of V2 and V3, and store the subtraction result in V1.

Example:

Subtract 1 form the value contained within the internal memory address #2

$2 = $2 - 1

The value contained within the internal memory address #1 is subtracted from the value contained within the internal memory address #2 and the result of this calculation is stored in the internal memory address #3.

$3 = $2 - $1

Subtract 1.9 form the value contained within the internal memory address #4

$4 = FSUB($4, 1.9) (Signed DW)

The floating point value contained within the internal memory address #4 is subtracted from the floating point value contained within the internal memory address #6 and the result of this calculation is stored in the internal memory address #8.

$8 = FSUB($4, $6) (Signed DW)

■ ***, FMUL**

Multiplication

Equation: V1 = V2 * V3

V1 = FMUL(V2, V3) (Signed DW)

Perform the multiplication of V2 and V3, and store the multiplication result in V1.

Example:

The value contained within the internal memory address #2 is multiplied by 2

$2 = $2 * 2

The value contained within the internal memory address #2 is multiplied by #1 and the result of this calculation is stored in the address #3.

$3 = $2 * $1

The value contained within the internal memory address #4 is multiplied by 1.5

$4 = FMUL($4, 1.5) (Signed DW)

The floating point value contained within the internal memory address #4 is multiplied by #6 and the result of this calculation is stored in the address #8.

$8 = FMUL($4, $6) (Signed DW)

■ **/, FDIV**

Division

Equation: V1 = V2 / V3

V1 = FDIV(V2, V3) (Signed DW)

Perform the division of V2 and V3, and store the division result in V1. The value contained

within V3 cannot be equal to 0(zero).

Example:

The value contained within the internal memory address #2 is divided by 1.

$2 = $2 / 1

The value contained within the internal memory address #2 is divided by 5 and the result of this calculation is stored in the address #3.

$3 = $2 / 5

The value contained within the internal memory address #4 is divided by 4.3 and the result of this calculation is stored in the address #6.

$6 = FDIV($4, 4.3) (Signed DW)

- **%, FMOD**

Get Remainder

Equation: V1 = V2 % V3

V1 = FMOD(V2, V3) (Signed DW)

Perform the division of V2 and V3, and store the remainder in V1. The value contained within V3 cannot be equal to 0(zero).

Example:

The value contained within the internal memory address #2 divided by 5 and the remainder of the result of this calculation is stored in the address #3.

$3 = $2 % 5

The value contained within the internal memory address #4 divided by 4 and the remainder of the result of this calculation is stored in the address #6.

$6 = FMOD($4, 4) (Signed DW)

- **ADDSUMW**

Repeated Addition

Equation: V1 = ADDSUMW(V2, V3)

1. **When V3 is an internal memory address, it will perform the addition of the value contained from V2 to the address which the value is the same as the value contained within V3, and store the repeated addition result in V1.**
2. **When V3 is a value, it will perform the addition on the value contained within V3 addresses started from address V2, and store the repeated addition result in V1.**

Example:

$2 = 1

$3 = 2

$4 = 3

$5 = 2

$10 = 3

$0 = ADDSUMW($2, $10)

Add up the values contained within the internal memory address #2, #3, and #4 (as the value of #4 is the same as the value of #10) and the grand total is stored in the address #0. The value of the grand total is equal to 6.

$0 = ADDSUMW($2, 4)

Add up the values contained within the internal memory address #2, #3, #4, and #5 (4 addresses started from address #2) and the grand total is stored in the address #0. The value of the grand total is equal to 8.

- **SIN**

Sine Function Operation

Equation: V1 = SIN(V2) (Signed DW)

Perform the sine function operation on V2, and store the remainder in V1.

Example:

$0 = SIN(50)

The result is $0 = 0.766

- **COS**

Cosine Function Operation

Equation: V1 = COS(V2) (Signed DW)

Perform the cosine function operation on V2, and store the remainder in V1.

Example:

$0 = COS(50)

The result is $0 = 0.643

- **TAN**

Tangent Function Operation

Equation: V1 = TAN(V2) (Signed DW)

Perform the tangent function operation on V2, and store the remainder in V1.

Example:

$0 = TAN(50)

The result is $0 = 1.192

■ **COT**

Cotangent Function Operation

Equation: V1 = COT(V2) (Signed DW)

Perform the cotangent function operation on V2, and store the remainder in V1.

Example:

$0 = COT(50)

The result is $0 = 0.839

■ **SEC**

Secant Function Operation

Equation: V1 = SEC(V2) (Signed DW)

Perform the secant function operation on V2, and store the remainder in V1.

Example:

$0 = SEC(50)

The result is $0 = 1.556

■ **CSC**

Cosecant Function Operation

Equation: V1 = CSC(V2) (Signed DW)

Perform the cosecant function operation on V2, and store the remainder in V1.

Example:

$0 = CSC(50)

The result is $0 = 1.305

■ **Logical Operation**

Six logical operations includes OR, AND, XOR, NOT, Shift-left and Shift-right. There are three operands for each operation. Each operand can be internal memory or constant. But it shall be internal memory only when outputting. The unit can be Word and Double Word. Please refer to following table 4.3.2 and examples below for more information.

Command	Equation	Description	Remark
\|	***V1 = V2 \| V3***	Bit OR operation	The calculation result can be stored as WORD and DWORD. V1 can be internal memory only. V2 and V3 can be internal memory or constant.
&&	***V1 = V2 && V3***	Bit AND operation	
^	***V1 = V2 ^ V3***	Bit XOR operation	
NOT	***V1* = NOT *V2***	Bit NOT operation	
<<	***V1 = V2 << V3***	Bit Shift-left operation	
>>	***V1 = V2 >> V3***	Bit Shift-rightt operation	

Table 4.3.2 Logical operation command table

- **| Operand**

Bit OR operation

Equation: V1 = V2 | V3

Perform the Bit OR operation on V2 and V3 and save the result of this calculation in V1.

Example:

$2 = F000H

$4 = 0F00H

$6 = $2 | $4

Store the result of $6 in FF00H

- **&& Operand**

Bit AND operation

Equation: V1 = V2 && V3

Perform the Bit AND operation on V2 and V3 and save the result of this calculation in V1.

Example:

$2 = F000H

$4 = 0F00H

$6 = $2 && $4

Store the result of $6 in 0000H

- **^ Operand**

Bit XOR operation

Equation: V1 = V2 ^ V3

Perform the Bit XOR operation on V2 and V3 and save the result of this calculation in V1.

Example:

$2 = F100H

$4 = 0F00H

$6 = $2 ^ $4

Store the result of $6 in FE00H

- **NOT**

Bit NOT operation

Equation: V1 = NOT V2

Perform the Bit NOT operation on V2 and V3 and save the result of this calculation in V1.

Example:

$2 = F100H

$4 = NOT $2

Store the result of $4 in 0EFFH

- **<< Operand**

Bit Shift-left operation

Equation: V1 = V2 << V3

Shift V2 (WORD/DWORD) data to left (number of bit is V3). The result of this calculation is stored in V1.

Example:

$2 = F100H

$1 = $2 << 4

$2 shift-left 4 bits and the result (1000H) is stored in $1.

$2 = 11111000

$1 = $2 << 3

$2 shift-left 3 bits and the result (11111000000) is stored in $1.

- **>> Operand**

Bit Shift-right operation

Equation: V1 = V2 >> V3

Shift V2 (WORD/DWORD) data to right (number of bit is V3). The result of this calculation is stored in V1. If the shift number of bit is more than the address itself, the excess part will be ignored.

Example:

$2 = F100H

$1 = $2 >> 4

$2 shift-right 4 bits and the result (0F10H) is stored in $1.

$2 = 00011111

$1 = $2 >> 3

$2 shift-right 3 bits and the result (00000011) is stored in $1.

- **Data Transfer**

There are five commands for data transfer, including =, BMOV, FILL, CHR and FMOV. Please refer to following table 4.3.3 and examples below for more information.

Command	Equation:	Description	Remark
=	**V1 = V2**	Transfer data	V1 only can be PLC address or internal memory.

Command	Equation:	Description	Remark
BMOV	**BMOV(V1, V2, V3)**	Block move	V1 and V2 only can be PLC address or internal memory.
FILL	**FILL(V1, V2, V3)**	Fill the memory	V1 can be internal memory only.
CHR	**CHR(V1, "V2")**	Convert text to ASCII code	V2 is a input string of texts
FMOV	**V1 = FMOV(V2)**	Transfer floating point data	

Table 4.3.3 Data transfer command table

■ **= Operand**

Transfer data

Equation: V1 = V2

Transfer data from V2 to V1. No data change within V2 after command is executed.

Example:

The data within the internal memory address $0 is designated the constant 4.

$0 = 4

The data within the internal memory address #4 is designated the same as the data within the internal memory address $2.

$4 = $2

■ **BMOV**

Block move Copy Block

Equation: BMOV(V1, V2, V3)

BMOV (V1, V2, V3) means to move data (number of word is V3) of data from address V2 to address V1 in block. If the block length is more than internal memory or maximum number of PLC address, there will be error occurred when compiling.

Example:

Move the data in $0, $1, $2, $3, $4 to $10, $11, $12, $13 in order. Total the same 4 Words.

$0 = 1

$1 = 2

$2 = 3

$3 = 4

BMOV($10, $1, 4)

After executing BMOV command, $10=1, $11=2, $12=3, $13=4.

■ **FILL**

Fill the Memory

Equation: FILL(V1, V2, V3)

FILL(V1, V2, V3) means to fill address V1 with data in address V2 and the data number is V3. If the block length is more than internal memory or maximum number of PLC address, there will be error occurred when compiling.

Example:

$5 = 10

FILL($0, $5, 4)

Executing FILL command to fill $0, $1, $2, $3 with constant 10.

- **CHR**

Convert Text to ASCII code

Equation: CHR(V1, "V2")

CHR(V1, "V2") means to convert text in address V2 to ASCII code and store in V1. The maximum length is 128 words. One address can store up to two words. The excess word will be stored in next address in order. The low and high bit of the converted ASCII code will be exchanged.

Example:

CHR($1, "AB12")

After executing CHR command, 4241H will be stored in $1 and 3130H will be stored in $2.

- **FMOV**

Transfer Floating Point Data

Equation: V1 = FMOV(V2) (Signed DW)

Transfer floating point data from V2 to V1. No data change within V2 after the command is executed.

Example:

Transfer constant 44.3 to the internal memory address $0.

$0 = FMOV(44.3) (Signed DW)

Transfer the same data of PLC 1@C200 to the internal memory address $0.

$0 = FMOV(1@C200) (Signed DW)

- **Data Conversion**

Command	Equation	Description
BCD	**V1 = BCD(V2)**	Converts BIN Data into BCD
BIN	**V1 = BIN(V2)**	Decimal value conversion
W2D	**V1 = W2D(V2)**	Convert WORD to DWORD
B2W	**V1 = B2W(V2, V3)**	Convert BYTE to WORD
W2B	**V1 = W2B(V2, V3)**	Convert WORD to BYTE
SWAP	**SWAP (V1, V2, V3)**	Swap BYTE data of the WORD
XCHG	**XCHG (V1, V2, V3)**	Exchange data

Command	Equation	Description
MAX	**V1 = MAX(V2, V3)**	Get Maximum value
MIN	**V1 = MIN(V2, V3)**	Get Minimum value
A2H	**V1 = A2H(V2)**	Convert ASCII code to 4-digit integer
H2A	**V1= H2A (V2)**	Convert hexadecimal integer to ASCII code
FCNV	**V1= FCNV (V2)**	Convert integer to floating point value
ICNV	**V1= ICNV (V2)**	Convert floating point value to integer

Table 4.3.4 Data conversion command table

- **BCD**

Convert BIN Data into BCD value

Equation: *V1* = BCD(*V2*)

The binary data in V2 is converted into BCD value, and stored in V1.

Example:

The binary data in $4 is 5564. After executing BCD command, the binary data in $5 is converted to 5564H.

$4 = 5564

$5 = BCD($4)

- **BIN**

Converts BCD Data into BIN value

Equation: *V1* = BIN(*V2*)

The BCD data in V2 is converted into BCD value, and stored in V1.

Example:

The BCD (hexadecimal) data in $4 is 5564H. After executing BIN command, the BCD data in $5 is converted to 5564.

$4 = 5564H

$5 = BIN($4)

- **W2D**

Convert WORD to DWORD

Equation: V1 = W2D(V2)

The WORD value in V2 is converted into DWORD value, and stored in V1.

Example:

The WORD value in decimal format in $4 is -10. After executing W2D command, the value in $7 is converted to -10 in Double Word format. As it is in DWORD format, it indicates that the value has occupied $7 and $8 these two addresses.

$4 = -10 (Signed)

$7 = W2D($4)(Signed)

- **B2W**

Convert BYTE to WORD

Equation: V1 = B2W(V2, V3)

Convert BYTE data (number of byte is V3) from V2 to WORD value and store the result in V1. The high byte will be filled with 0. As the unit of V2 is in WORD format, each word of V2 can be converted into two words and stored in V1. Please note that the low and high byte of the converted WORD will be exchanged.

Example:

$10 = AB12 H

$11 = 34CD H

$20 = B2W($10,4)

Read 2 WORDS, i.e. 4 BYTES from $10 and convert 4 BYTES to 4 WORD. Then, store the result in $20 to $23. So, the result will be:

$20 = 12 H

$21 = AB H

$22 = CD H

$23 = 34 H

- **W2B**

Convert WORD to BYTE

Equation: V1 = W2B(V2, V3)

Convert WORD data (number of word is V3) from low-byte of V2 to BYTE format (discard high-byte of V2) and store the result in V1.

$10 = 1234 H

$11 = 5678 H

$12 = AB H

$13 = CD H

$20 = W2B($10,4)

Read 4 WORDS from $10 and convert it to 4 BYTES, i.e. 2 WORDS. Then, store the result in $20 to $21. So, the result will be:

$20 = 7834 H

$21 = CDAB H

■ **SWAP**

Swap BYTE Data of the WORD

Equation: SWAP (V1, V2, V3)

Swap high-byte and low-byte of V2, V2+1, V2+2…V2+V3 (WORD) and store the result in the starting position of V1, V1+1, V1+2…V1+V3 in order.

Example:

SWAP($1, $10, 5)

Swap the high-byte and low-byte of $10, $11, …, $14 and store the result in $1, $2, …, $5 in order.

SWAP($2, $11, 1)

If $11 = 1234H, $2 = 3412H after executing SWAP command.

■ **XCHG**

Exchange Data

Equation: XCHG (V1, V2, V3)[(DW)]

Exchange the data of V2, V2+1, V2+2…V2+V3 and the data of V1, V1+1, V1+2.., V1+V3. The data of V1 and V2 will be exchanged after executing XCHG command.

Example:

XCHG($1, $10, 5)

Exchange the data of $10, $11, …, $14 and the data of $1, $2, ..., $5 in order.

XCHG($2, $11, 1)

If $11 = 1234H and $2 = 5678H, $2 = 1234H and $1 = 5678H after executing XCHG command.

■ **MAX**

Get Maximum Value

Equation: V1 = MAX(V2, V3)

Get the maximum value from V2 and V3 and store the result in V1.

Example:

$1 = 2

$2 =10

$0 = MAX($1, $2)

The result is $0 = 10

■ **MIN**

Get Minimum Value

Equation: V1 = MIN(V2, V3)

Get the minimum value from V2 and V3 and store the result in V1.

Example:

$1 = 2

$2 = 10

$0 = MIN($1, $2)

The result is $0 = 2

- **A2H**

Convert 4 ASCII code to a four digits integer in hexadecimal format

Equation: V1 = A2H(V2)

Convert the ASCII code of V2 (4 WORDS) to integer and store the result in V1.

Example:

$10 = 0034H

$11 = 0033H

$12 = 0036H

$13 = 0038H

$1 = A2H($10)

After executing A2H command, the data in $1 will be converted to 4368H.

- **H2A**

Convert a four digits integer in hexadecimal format to 4 ASCII code

Equation: V1= H2A (V2)

Convert V2 (1 WORD in hexadecimal format) to the ASCII (4 WORDS) code and store the result in V1.

Example:

$2 = 1234H

$10 = H2A($2)

After executing H2A command, the result will be $10=0031H, $11=0032H, $12=0033H and $13=0034H.

- **FCNV**

Convert integer to floating point value

Equation: V1= FCNV (V2) (Signed DW)

Convert floating point value or integer in V2 to floating point value and store in V1.

Example:

$0 = 100

$2 = FCNV($0)(Signed DW)

The result is $2 = 100.0

■ ICNV

Convert floating point value to integer

Equation: V1= ICNV (V2) (Signed DW)

Convert floating point value or integer in V2 to integer and store in V1.

Example:

$2 = FMOV(100.5) (Signed DW)

$0 = ICNV ($2) (Signed DW)

The result is $0 = 100

■ Comparison

■ IF…THEN GOTO LABEL …

Equation: IF *expression* THEN GOTO LABEL *identifier*

If the command of *expression* is true, then it will go to LABEL *identifier* and perform the program.

Please refer to the following table for the command of *expression*.

Command	Description	Remark
V1 == V2	V1 is equal to V2	V1 and V2 should be internal memory or constant.
V1 != V2	V1 is not equal to V2	
V1 > V2	V1 is greater than V2	
V1 >= V2	V1 is greater than or equal to V2	
V1 < V2	V1 is smaller than V2	
V1<= V2	V1 is smaller than or equal to V2	
V1 && V2 == 0	Perform AND command on V1 andV2 and the result of AND operation is equal to 0	
V1 && V2 != 0	Perform AND command on V1 andV2 and the result of AND operation is not equal to 0	
V1== ON	V1 is ON	
V1== OFF	V1 is OFF	

Table 4.3.5 Comparison command table

Example:

When $2 is greater than or equal to 10, it will go to LABEL 1 and continue to perform the program.

IF $2 >= 10 THEN GOTO LABEL 1

…..

LABEL 1

…..

Equation: IFB *V1* == {ON | OFF} THEN GOTO LABEL *identifier*

If V1 is ON or OFF, it will go to LABEL *identifier* to perform the program. V1 is PLC address.

Example:

IFB 1@M0 == ON THEN GOTO LABEL 1

- **IF…THEN CALL …**

Equation: IF *V1* == *V2* THEN CALL *macro*

If V1 is equal to V2, it will call macro. V1 and V2 should be internal memory or constant.

Example

If $2 is equal to 10, then it will call sub-macro 1.

IF $2 = 10 THEN CALL 1

- **IF…ELSE…ENDIF**

Equation:

IF *expression1*

Statement1

ELSEIF *expression2*

Statement2

ELSE

Statement3

ENDIF

This is logical determination from multiple conditions. If *expression1* is true, *Statement1* will be executed. If *expression1* is false, it will run *expression2*. If *expression2* is true, *Stemenent2* will be executed. If both *expression1* and *expression2* are false, *Statement3* will be executed.

For the command of *expression*, please refer to table 4.3.5 (Comparison command table).

Example

If $1 is equal to 10, $1 = $1 + 1 is executed. If $1 is equal to 20, $1 = $1 + 2 is executed. If $1 is equal to other value, $1 = $1 + 15 is executed.

IF $1 == 10

$1 = $1 + 1

ELSEIF $1 == 20

$1 = $1 + 2

ELSE

$1 = $1 + 15

ENDIF

- **ENDIF**

ENDIF should be placed in the end of the IF comparison command. Please refer to the example of

comparison command, IF…ELSE…ENDIF.

- **FCMP**

Floating point value comparison command.

Equation: V1 = FCMP(V2, V3) (Signed DW)

V1	FCMP(V2, V3)
0	V2 = V3
1	V2 > V3
2	V2 < V3

- **Flow Control**

There are five types for flow control: GOTO, LABEL, CALL..RET, FOR…NEXT and END.

- **GOTO**

Unconditionally go to a specific Label. GOTO command will jump to designated label like Label V1 unconditionally.

Equation: GOTO LABEL V1

Go to the internal designated Label V1 in the program unconditionally.

Example:

Go to the position of designated Label 2 and continue to execute the program unconditionally.

GOTO LABEL 2

…..

LABEL 2

- **LABEL**

Label such as Label V1

Equation: LABEL V1

Please note that the label cannot be repeated in a Macro.

- **CALL..RET**

Call Sub-macro program

Equation: CALL V1

V1 represents the sub-macro number. The sub-macro number could be 1 ~ 512 and V1 can be internal memory or constant. The rights of macro control will be transferred to sub-macro when executing CALL V1 command. After CALL V1 command is executed and completed, V1 needs to return through RET command. RET command will transfer the rights of macro control to the next command of CALL command. The sub-macro number could be 1 ~ 512. Regarding the comment name of the sub-macro, the user can enter it freely. When calling sub-macro program, only the sub-macro number can be called.

However, in the sub-macro program, the user can call another sub-macro program but the levels for calling sub-macro should be less than 6 levels.

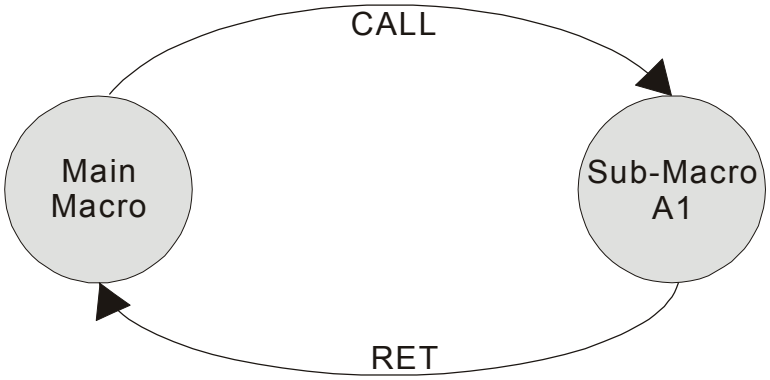


Fig. 4.3.1

■ **FOR…NEXT**

Program Loop

Equation:

FOR V1

Statement

NEXT

It is for multi-level loops. The multi-level loop can be up to 3 levels. V1 can be the internal memory or constant. When this command is executed, the number of V1 *Statement* can be executed continuously. *Statement* is the combination of a section of macro commands.

Example:

$10 = 10

$1 = 0

FOR $10

$1 = $1 + 1

$10 = 2

NEXT

After the operation, the result is $1 = 10, $10 = 2.

Please note that the loop times will not change even if the user resets the value within $10.

■ **END**

End the macro

Equation:

Statements1

END

Statements2

End command is used to end the macro program. *Statements2* will not be executed after *Statemenets1* is executed. The program will execute from the command of the first line next time. **Please note that END means finishing executing macro. If END command is used in sub-macro, it indicates the program is end here. If the user wants to return to the original macro program, please use RET command.**

Example:

$1 = 10

$1 = $1 + 1

END

$1 = $1 + 1

After the operation, the result is $1 = 11, not $1 = 12 as the END command has ended the macro program.

- **Bit Settings**

Please refer to the following table for the commands of Bit Settings.

Command	Equation	Description
SETB	SETB V1	Set V1 Bit to be ON
CLRBL	CLRB V1	Set V1 Bit to be OFF
INVB	INVB V1	Set V1 Bit to be inversed
GETB	V1 = GETB V2	Get V2 Bit value and store in V1

Table 4.3.6 Bit setting command table

- **SETB**

Set specific bit to be ON.

Equation: SETB V1

Set V1 Bit to be ON

Example:

Set the value of 5th Bit within the internal memory $1 to be ON.

$1 = 0000000000000000B

SETB $1.5

The result is $1 = 0000000000010000B

- **CLRB**

Set specific bit to be OFF.

Equation: CLRB V1

Set V1 Bit to be OFF

Example:

Set the value of 15th Bit within the internal memory $2 to be OFF.

$2 = 1111111111111111B

CLRB $2.15

The result is $2 = 0111111111111111B

- **INVB**

Set specific bit to be inversed. ON → OFF, OFF → ON

Equation: INVB V1

Set V1 Bit to be inversed. ON → OFF, OFF → ON

Example:

Set the value of 0th Bit within the internal memory $3 to be inversed.

$3 = 1111111111111111B

INVB $3.0

The result is $3 = 1111111111111110B

- **GETB**

Get bit value

Equation: V1 = GETB V2

Get V2 Bit value and store in V1

Example:

Get the value of 3rd Bit within the internal memory $0 and store it to the 5th Bit within the internal memory $10.

$0 = 0000000000000100B

$10 = 0

$10.5 = GETB $0.3

The result is $10 = 0000000000010000B

- **Communication**

Command	Equation	Description
INITCOM	**V1= INITCOM (V2)**	Initial setup COM port
ADDSUM	**V1=ADDSUM(V2, V3)**	Use addition to calculate checksum
XORSUM	**V1 = XORSUM(V2, V3)**	Use XOR to calculate checksum
PUTCHARS	**V1 = PUTCHARS(V2, V3, V4)**	Output characters by COM port
GETCHARS	**V1 = GETCHARS(V2, V3, V4)**	Get characters by COM port
SELECTCOM	**SELECTCOM(V1)**	Select COM port
CLEARCOMBUFFER	**CLEARCOMBUFFER(V1, V2)**	Clear COM port buffer
CHRCHKSUM	**V1 = CHRCHKSUM(V2, V3, V4)**	Calculate the length of texts and checksum

Table 4.3.7 Communication command table

■ INITCOM

INITCOM → Initial setup COM port to start communication and set communication protocol.

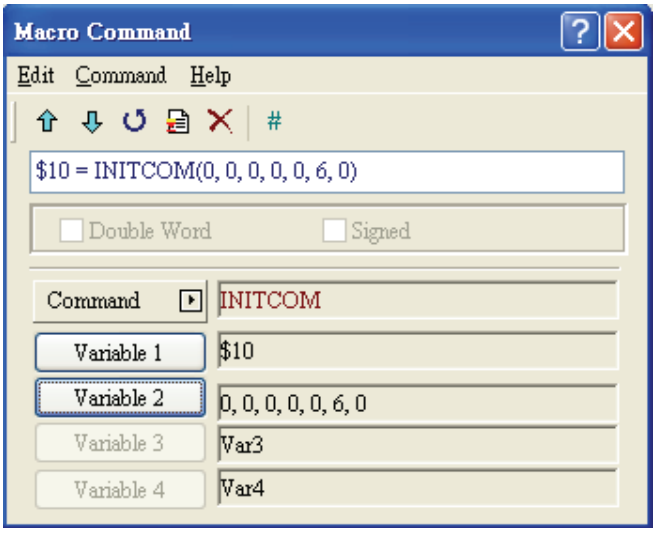


Fig. 4.3.2 INITCOM

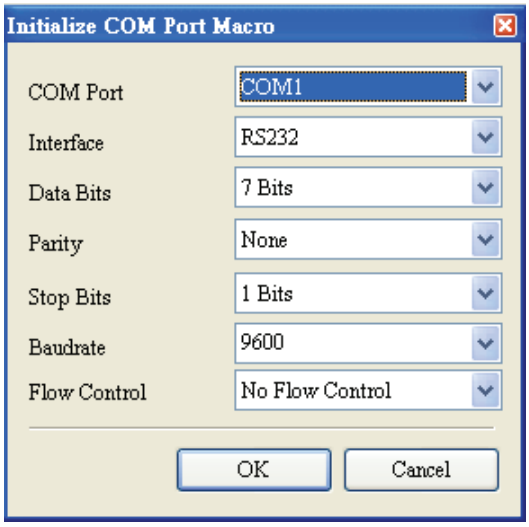


Fig. 4.3.3 Variable2 settings in INITCOM (communication protocol)



Fig. 4.3.4 COM port



Fig. 4.3.5 Communication interface



Fig. 4.3.6 Data Bit



Fig. 4.3.7 Parity bit



Fig. 4.3.8 Stop bit

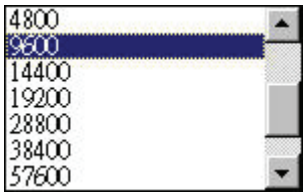


Fig. 4.3.9 Baud rate

Flow Control

The transmission speed and communication validity are enhanced during communication due to new transmission technology, such as compress immediately, debug,…etc. But the new technology also makes the transmission speed between HMI and PC will be longer than the actual transmission speed. Therefore, ensure the data security and transmit complete data between computer and HMI, when transmitting data through serial communication port, the flow control is necessary.

No Flow Control

Flow control function is disabled.

CTS/RTS

It is flow control for hardware. It uses handshaking signal to control receiving and sending data. The control is achieved via internal modem or external modem that connects to HMI by connecting cable.

DSR/DTR

It is flow control for hardware also. It is used when PC and HMI is connected by cable directly.

XON/XOFF

It is flow control for software. It is only used for 2400bps modem. The control method is to generate control code by software and add it in the transmission data.



Fig. 4.3.10 Flow control

- **ADDSUM**

ADDSUM → It uses addition to calculate checksum.

V1=ADDSUM(V2, V3). V1 is the value after calculation, V2 is the starting address for calculation and V3 is data length.

- **XORSUM**

XORSUM → It uses XOR to calculate checksum.

V1=XORSUM (V2, V3). V1 is the value after calculation, V2 is the starting address for calculation and V3 is data length.

- **PUTCHARS**

PUTCHARS → Output characters by COM port.

V1= PUTCHARS (V2, V3, V4). V1 is the response value after communication. If the communication has succeeded, the result will be stored in $1. If the communication has failed, the result will be stored in $0. V2 is the starting address of transmission data, V3 is data length, and V4 is the maximum allowable communication time and its unit is ms.

■ GETCHARS

GETCHARS → Get characters by COM port.

V1= GETCHARS (V2, V3, V4). V1 is the response value after communication. If the communication has succeeded, the result will be stored in $1. If the communication has failed, the result will be stored in $0. V2 is the starting address of transmission data, V3 is data length, and V4 is the maximum allowable communication time and its unit is ms.

■ SELECTCOM

SELECTCOM → It is used to select COM port. 0 represents COM1, and 1 represents COM2.

When using communication macro, the designated COM port cannot be the same as the system COM port which has used. All communication commands will be processed via the COM port the user selects after executing this command. Therefore, different macros will not support each other and there will be no interference between different macros.

■ CLEARCOMBUFFER

Clear COM port buffer.

Equation: CLEARCOMBUFFER(V1, V2)

V1 is the number of communication port. It represents as constant 0(COM1) or 1(COM2).

V2 is the type of buffer area. It represents as constant 0 (receiving buffer area) or 1(sending buffer area)

Example:

Clear receiving buffer area of COM2

CLEARCOMBUFFER(1, 0)

■ CHRCHKSUM

Calculate the data length of texts or characters and checksum.

Equation: V1 = CHRCHKSUM(V2, V3, V4)

V1 is the internal memory address where stores the text length of V2.

V2 is the string of text.

V3 is the internal memory address where stores the checksum of V2.

V4 is the data length of the checksum that stores in V3. 1 represents Byte and 2 represents Word.

Operation of checksum:

Convert each word of the string of text to ASCII code and add up them. For example, convert ’2’ to ASCII code ‘31H’, convert ’4’ to ASCII code ‘34H’ and vise versa. Therefore, the checksum of ‘A’ and ‘C’ is 41H + 43H = 84H.

Example:

Calculate the data length of "24" and checksum

$0 = CHRCHKSUM("24", $10, 2)

After the above operation, 4 is stored in $0 and 4 represents the data length is 2 WORDS. The checksum stored in $10 is 66H.

■ Communication Macro Example

This communication macro example can be downloaded via the following link:

http://59.120.64.39:81/phpbb2/files/comm_marco.dop

This example shows that the user can use communication macro to control the output points of Delta DVP PLC and set SV value of DTB temperature controller to 20°C.

■ PLC

Set ON/OFF macro on Y0 button.

The communication commands which can trigger Y0 are listed as follows:

ASCII	:	0	1	0	5	0	5	0	0	F	F	0	0	F	6	\r	\n
HEX	3A	30	31	30	35	30	35	30	30	46	46	30	30	46	36	0D	0A

ON Macro

$0 = INITCOM(0, 0, 0, 2, 0, 6, 0)	Set communication setting as COM1,RS232,9600,7,E,1
SELECTCOM(0)	Select COM1 port.
CHR($11, "01050500FF00F6")	Convert the string of commands to ASCII code and store data from $11.
$10 = 3A00H	Set starting Bit. Because the value of high byte and low byte will be exchanged when HMI sends command, even though the starting Bit is 3A when sending data, it is needed to input 3A00.
$18 = 0A0DH	Set end Bit. Because the value of high byte and low byte will be exchanged when HMI sends command, even though the end Bit is 0D0A when sending data, it is needed to input 0A0D.
$50 = PUTCHARS($10, 18, 500)	Start to send data from $10, the data length is 18 bytes and the timeout setting is 500ms.
$51 = GETCHARS($100, 18, 500)	Receive the PLC response data after communication. The received data is stored in $100, the data length is 18 bytes and the timeout setting is 500ms.

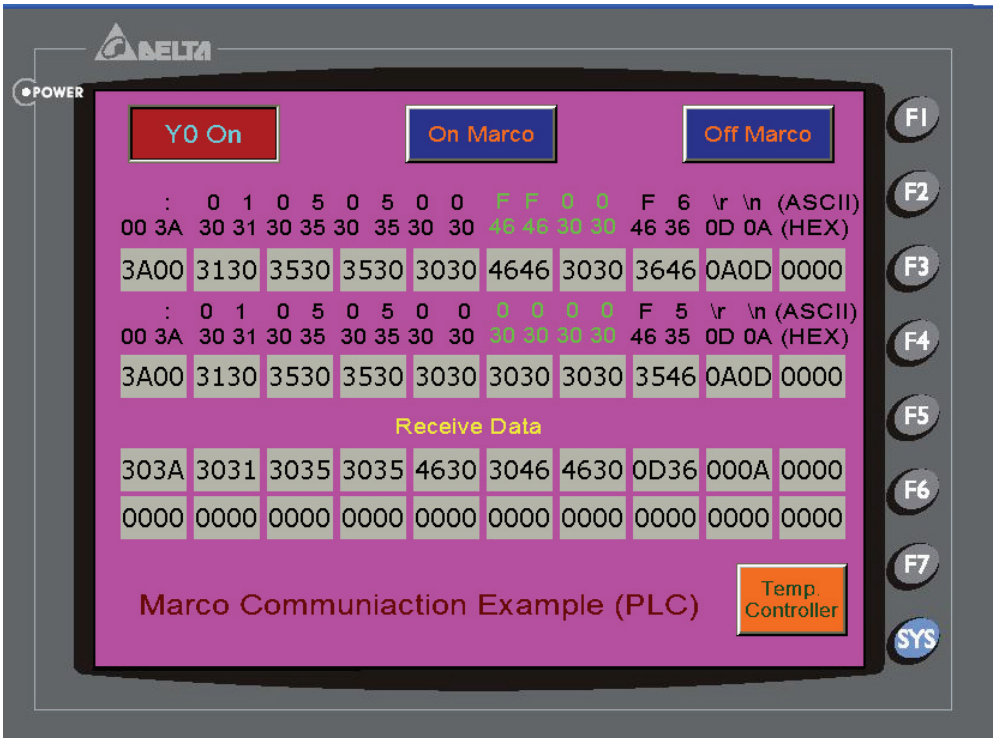
The communication commands which can reset Y0 are listed as follows:

ASCII	:	0	1	0	5	0	5	0	0	0	0	0	0	F	5	\r	\n
HEX	3A	30	31	30	35	30	35	30	30	40	40	30	30	46	35	0D	0A

OFF Macro

$0 = INITCOM(0, 0, 0, 2, 0, 6, 0)	Set communication setting as COM1,RS232,9600,7,E,1
SELECTCOM(0)	Select COM1port.
CHR($21, "010505000000F5")	Convert the string of commands to ASCII code and store data from $21.

$20 = 3A00H	Set starting Bit. Because the value of high byte and low byte will be exchanged when HMI sends command, even though the starting Bit is 3A when sending data, it is needed to input 3A00.
$28 = 0A0DH	Set end Bit. Because the value of high byte and low byte will be exchanged when HMI sends command, even though the end Bit is 0D0A when sending data, it is needed to input 0A0D.
$50 = PUTCHARS($20, 18, 500)	Start to send data from $10, the data length is 18 bytes and the timeout setting is 500ms.
$51 = GETCHARS($110, 18, 500)	Receive the PLC response data after communication. The received data is stored in $100, the data length is 18 bytes and the timeout setting is 500ms.



■ **DTB**

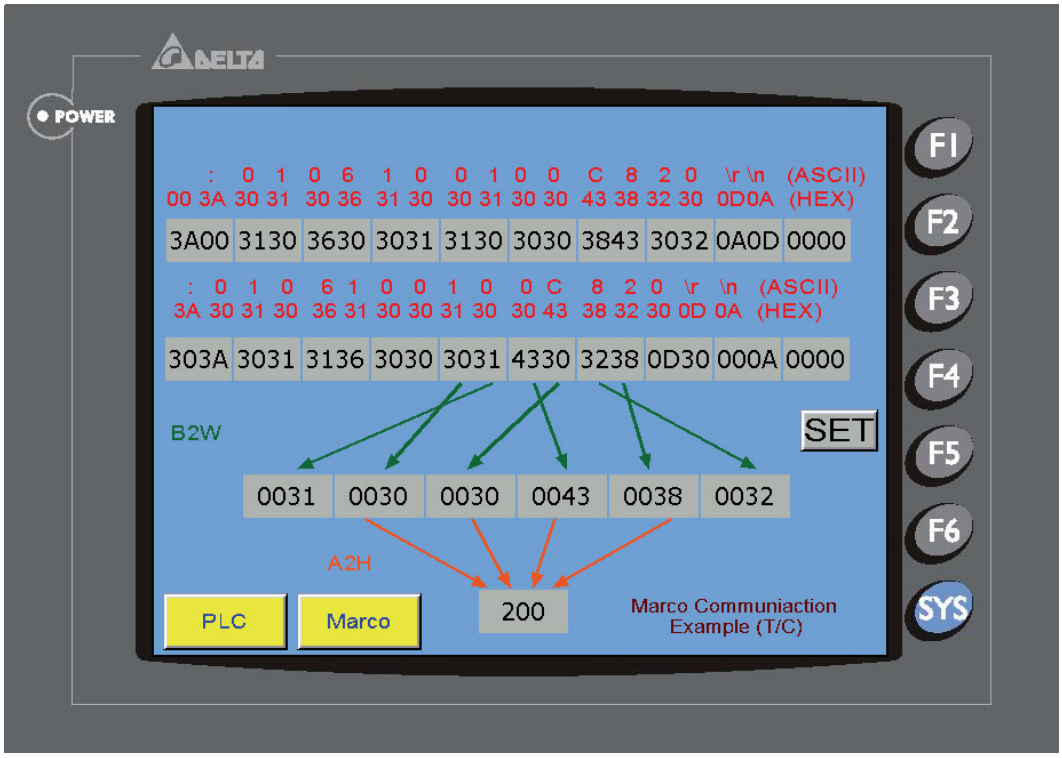
When using ON Macro, the communication commands used to set SV value (1001H) of DTB temperature controller to 20°C are listed as follows:

ASCII	:	0	1	0	6	1	0	0	1	0	0	C	8	2	0	\r	\n
HEX	3A	30	31	30	36	31	30	30	31	30	30	43	38	32	30	0D	0A

ON Macro

$100 = INITCOM(1, 2, 0, 2, 0, 6, 0)	Set communication setting as COM2, RS485, 9600, 7, E, 1 (Regarding the communication setting of DTB series temperature controller, please refer to DTB series user manual).
SELECTCOM(1)	Select COM2 port.
CHR($1002, "0106100100C820")	Convert the string of commands to ASCII code and store data from $1002.

$1001 = 3A00H	Set starting Bit. Because the value of high byte and low byte will be exchanged when HMI sends command, even though the starting Bit is 3A when sending data, it is needed to input 3A00.
$1009 = 0A0DH	Set end Bit. Because the value of high byte and low byte will be exchanged when HMI sends command, even though the end Bit is 0D0A when sending data, it is needed to input 0A0D.
$1500 = PUTCHARS($1001, 20, 500)	Start to send data from $1001, the data length is 20 bytes and the timeout setting is 500ms.
$1501 = GETCHARS($1121, 20, 500)	Receive the PLC response data after communication. The received data is stored in $1121, the data length is 20 bytes and the timeout setting is 500ms.
$1050 = B2W($1125, 6)	Decompose received ACSII code into one BYTE and one BYTE from $1125 respectively and convert them into WORD format.
$1060 = A2H($1051)	Then, start to convert the WORD data into the value in hexadecimal format from $1051 and display the result in decimal format on the screen.



■ **Others**

Command	Equation	Descrption
TIMETICK	**V1 = TIMETICK**	Get the time from system startup to present
GETLASSERROR	**V1 = GETLASTERROR**	Get last error value
#	**#V1**	Comment
delay	**delay V1**	System delay
GETSYSTEMTIME	**V1 = GETSYSTEMTIME**	Get system time

Command	Equation	Descrption
SETSYSTEMTIME	**SETSYSTEMTIME(V1)**	Set system time
GETHISTORY	**V1 = GETHISTORY (V2, V3, V4, V5, V6)**	Get history data

- **TIMETICK**

TIMETICK → Get the time from system startup to present and put into the specific address. An increment of 1 means 100ms is added.

- **GETLASTERROR**

GETLASTERROR → Get last error value. If there is no error occurred, the result of GETLASTERROR will be 0. Even if each Macro is executed simultaneously, the error message will not interfere with one another. For error code information, please refer to section 4.4.

- **COMMENT**

COMMENT → It lets Macro to be readable. Using this command will not affect macro function. The user only needs to put "#" in front of the equation and the macro will become readable. If the user wants to change the comment to be back to equation, just remove the "#" symbol.

- **Delay**

Delay → Delays the user setting time by system. As HMI system is a multiplexer system, the system delay problem may occur. Therefore, setting time will be increased due to "system busy" and the condition that the setting time move forward will not happen. But too many delay time settings may result in slow response of HMI. The unit of delay time is ms.

- **GETSYSTEMTIME**

Get system time

Equation: V1 = GETSYSTEMTIME

V1 is the starting address of continuous 7 Words within the internal memory address.

V1 Year

V1 + 1 Month

V1 + 2 Date

V1 + 3 Week

V1 + 4 Hour

V1 + 5 Minute

V1 + 6 Second

Example:

Now the system time is 2006/01/04 Wed 09:26:25. Using this command to get the current system time and store in $1~$7.

$1 = GETSYSTEMTIME

Get $1 = 2006, $2 = 01, $3 = 4, $4 = 3, $5 = 9, $6 = 26, $7 = 25

- **SETSYSTEMTIME**

Set system time

Equation: SETSYSTEMTIME(V1)

V1 is the starting address of continuous 7 Words within the internal memory address.

V1 Year

V1 + 1 Month

V1 + 2 Date

V1 + 3 Week

V1 + 4 Hour

V1 + 5 Minute

V1 + 6 Second

Example:

Set the current system time as 2006/01/04 Wed 09:26:25.

$1 = 2006

$2 = 1

$3 = 4

$4 = 3

$5 = 9

$6 = 26

$7 = 25

SETSYSTEMTIME($1)

- **GETHISTORY**

Get history data

Equation: V1 = GETHISTORY (V2, V3, V4, V5, V6)

V1 is the internal memory address where store the data length.

V2 is the internal memory, constant, the buffer number of history buffer area.

V3 is the internal memory, constant, the starting address for sampling.

V4 is the internal memory, constant, the points for reading

V5 is the internal memory, controller address, the address where store the data

V6 is the internal memory, constant, the data type for reading

0: Data, 1: Time, 2: Time and Data

4.4 Error Messages

When compiling, it will shows errors in output window for user to find out easily. Some errors occur because of the user's carelessness, sometimes just because the user misses an input command. Some errors will be found out easily in a short program. But that will be difficulty in a long Macro. To help the user debug, HMI editing software provides error messages when compiling program for reminding the user what the error is.

- **Error messages when editing**

 - **Code – 100: LABEL cannot be found**

 There is no such LABEL that GOTO designates.

 - **Code – 101: Recursion occurs**

 This error message is usually occurred in sub-macro. The ability of a sub-macro to CALL itself is called recursion. No matter it is called directly or indirectly. Basically, recursion cannot be adopted for sub-macro. The user can use GOTO or FOR (infinite times) to replace it.

 - **Code – 102: More than 3 nested FOR is used**

 This error message is to warn the user not to use more than 3 nested FOR commands. The purpose is to avoid insufficient memory. The user can use GOTO or IF to replace it.

 - **Code – 103: Sub-macro does not exist**

 This error message means that there is no sub-macro in the program. For example, CALL 5 means CALL sub-macro 5. If the user does not edit sub-macro 5 in the program, this error message will display to warn the user. The purpose is to warn the user to be more careful when editing (reduce input error or avoid forgetting editing the corresponding sub-macro) and prevent unexpected error.

 - **Code – 104: Number of NEXT is less than the number of FOR**

 Number of NEXT and FOR should match. This error code is used to remind the user to find the missing NEXT.

 - **Code –105: Number of FOR is less than the number of NEXT**

 Number of FOR and NEXT should match. This error code is used to remind the user if there is any missing FOR.

 - **Code–106: Repeated LABEL**

 This error message means that there are repeated LABEL in the same Macro. It means that when executing GOTO command, two different results will be generated and the program will be confusing with that. In order to avoid unexpected error, the user will get an error message during editing.

- **Code–107: There is RET in Macro**

This error message means that there is RET command in Macro. RET command should be used for sub-macro to return program. It means that the program does not finish. If the program needs to be finished in Macro, please use END, not RET.

- **HMI Macro Error Messages**

The user can read error messages by macro. Once there is an error and the user execute's a correct command before reading error message, the error message will be overwritten. When executing each macro, each Macro error message will not be influenced by another macro.

- **Code–10: GOTO Error**

This message means that there is GOTO error in macro.

- **Code–11: Stack Overflow**

This message means that stack in macro is full. That may be cause by using too many sub-macros or execute different macros at the same time. This is to avoid insufficient memory.

- **Code–12: CALL Empty Sub-macro**

This is CALL sub-macro error. The sub-macro that is called should not be an empty sub-macro. This message is to avoid unexpected error.

- **Code–13: Data Read Error**

This is data read error. Sometimes this may be caused by memory data error but most of the time is the controller data read error.

- **Code–14: Data Write Error**

This is data write error. Sometimes this may be caused by memory data error but most of the time is the controller data write error.

- **Code–15: Divisor is 0**

This error message means that the devisor is 0 when performing division operation.

■ **HMI Communication Error Messages**

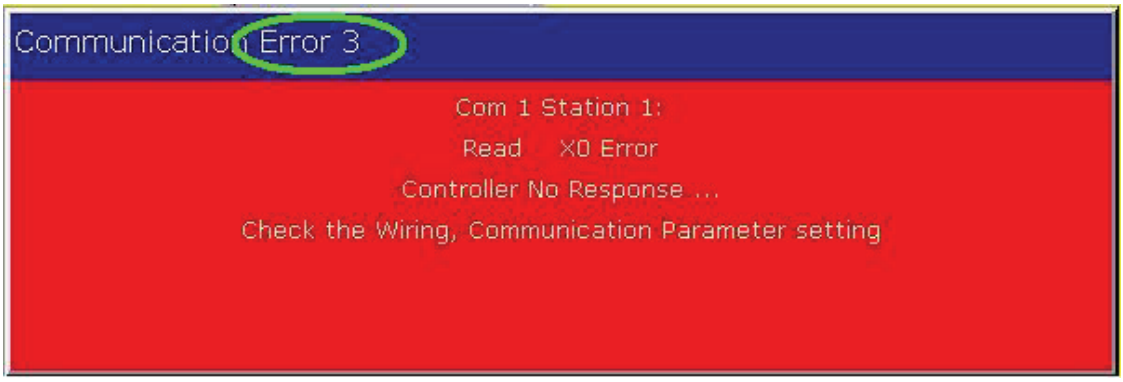


Fig. 4.4.1 Example of HMI Communication Error Message

When HMI cannot communicate with the controller, please pay close attention on the information shown on HMI screen. If you cannot identify it, please read the error code displayed on HMI screen (Fig. 4.4.1) and contact our service personnel. We will tell you the next step, where the point is and how to debug according the error messages you get to dispel the doubt that HMI cannot communicate with the controller. For the meaning of communication error code, please refer to the following:

02 - Unknow

03 - NoResponse

04- HMICheckSumError

05 - ControllerCheckSumError

06 - CommandError

07 - AddressError

08 - ValueError

09 - ControllerBusy

0A - NoCTS

0B - NoResource

0C - NoService

0D - MustRetry

0E - HMIStationNumberError

0F - PLCStationNumberError

10 - UARTCommunicateFail

11 - NOTExecutableInRunMode

3F - OtherError

■ **Communication Busy**

Error Message: Com ? Station ?: Communication Busy ...

- **Unknown Code**

Error Message: Com ? Station ?: Receive Unknow Code ...

- **No Response from Controller**

Error Message: Com ? Station ?: Controller No Response ...

- **HMI CheckSum Error**

Error Message: Com ? Station ?: Check Sum Error in HMI Message ...

- **Controller CheckSum Error**

Error Message: Com ? Station ?: Check Sum Error in Controller Message ...

- **Incorrect Command**

Error Message: Com %d Station %d: Command Can Not be Executed ...

- **Incorrect Address**

Error Message: Com ? Station ?: Address Fault ...

- **Incorrect Value**

Error Message: Com ? Station ?: Value is Incorrect ...

- **Controller is Busy**

Error Message: Com ? Station ?: Controller is Busy ...

- **CTS Signal Fail**

Error Message: Com ? Station ?: CTS Signal Fail ...

- **No Such Resource in Controller**

Error Message: Com ? Station ?: No Such Resource ...

- **No Such Service in Controller**

Error Message: Com ? Station ?: No Such Service ...

- **Must Retry**

Error Message: Com ? Station ?: Must Retry ...

- **HMI Station Number Error**

Error Message: Com ? Station ?: HMI Station Number Error ...

- **Controller Station Number Error**

Error Message: Com ? Station ?: Controller Station Number Error ...

- **UART Communication Error**

Error Message: Com ? Station ?: UART Communication Error ...

- **Other Communication Error**

Error Message: Com? Station ?: Other Communication Error ...

Chapter 5 Control Block and Status Block

For two-way communication and display screen between DOP series and all brands' PLC, it needs to define the address of HMI control block and status block in Standard tab. Please choose **Options** > **Configuration** to find the Standard tab in Configuration dialog box (Fig. 5.1 and Fig. 5.2). Through the settings set in the Standard tab, the controller which is connected to HMI can know HMI internal operation, i.e. screen switch, backlight on and off, current priority, curve sampling data and clear flag, etc. information and the user can also get the current system status of HMI.

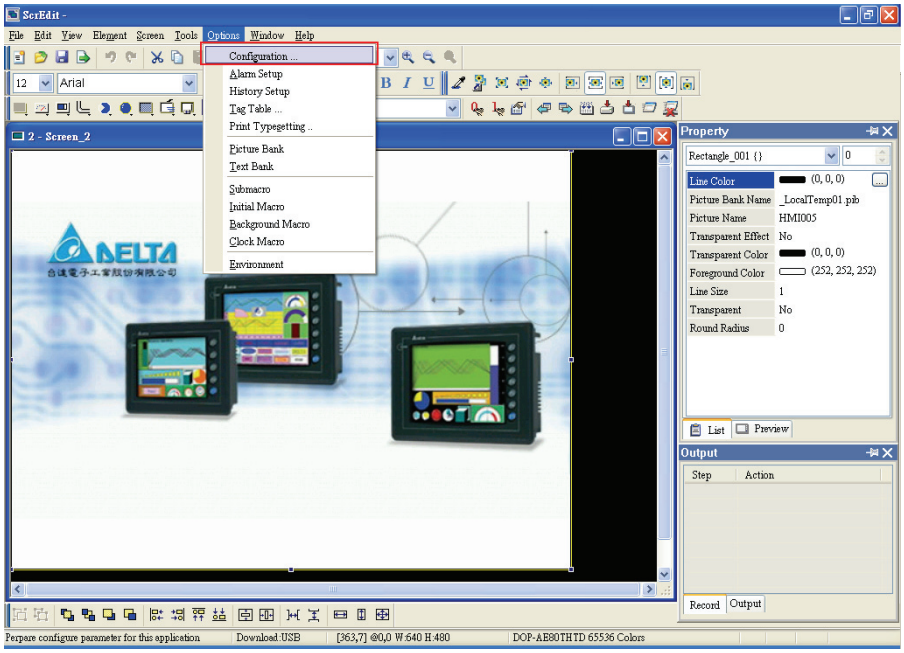


Fig. 5.1 Configuration settings

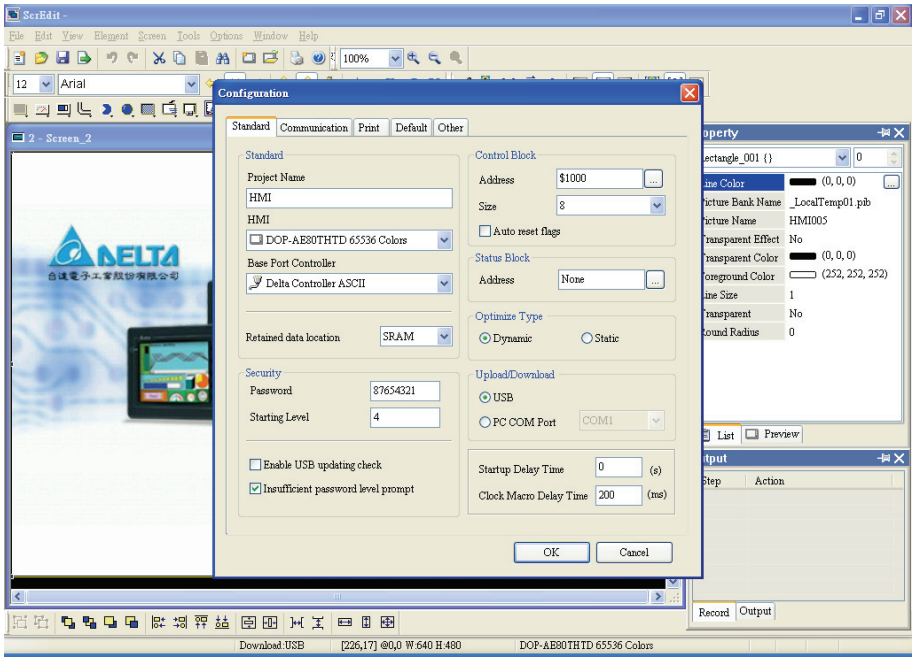


Fig. 5.2 Standard tab

The definition for each function and usage of Control Block and Status Block will be introduced in the following chapters.

5.1 Control Block

HMI can be controlled via PLC by designating the register from control block settings. The register is a continuous data block and its length is from 0 to 8 WORD's. The length is different depends on function. For example, it needs at least 7 WORD's for recipe function. When the control block size is set to 0, the control block function is disabled. If the control block function is enabled, HMI can judge the operation that is commanded by the external controller by reading the setting in the control block rapidly and continuously.

The function and explanation of each WORD are listed below. (In the following table, we assume that the user uses a Delta PLC, so the available starting addresses in control block are Dn ~ Dn+7 (D0 ~ D7).)

Word Number	Register Number	Example
0	Register for designating Screen Number (SNIR)	Dn (D0)
1	Control Flag Register (CFR)	Dn+1 (D1)
2	Curve Control Register (CUCR)	Dn+2 (D2)
3	Register for Sampling History Buffer (HBSR)	Dn+3 (D3)
4	Register for Clearing History Buffer (HBCR)	Dn+4 (D4)
5	Recipe Control Register (RECR)	Dn+5 (D5)
6	Register for designating Recipe Number (RBIR)	Dn+6 (D6)
7	System Control Flag Register (SCFR)	Dn+7 (D7)

- **Register for Designating Screen Number (SNIR)**

Word	Function
0	Designate screen number

This register SNIR (Dn) is used to designate a HMI screen by setting the PLC (D0). An HMI screen can be switched automatically by changing D0.

- **Control Flag Register (CFR)**

Bit Number	Function
0	Enable / disable communication
1	Enable / disable back light
2	Enable / disable buzzer
3	Clear alarm buffer
4	Clear alarm counter
5~7	Reserved
8	Setting user level bit0
9	Setting user level bit1
10	Setting user level bit2
11~15	Reserved

■ Enable / Disable Communication

Control the HMI communication. If the user choose the communication cancel times option in Communication tab in Configuration dialog box (Fig. 5.1.1), once reach the communication cancel times, it will disable HMI communication and set this flag to be ON. Although the communication is disabled at this time, it will not show the communication error message in the output window. The user can set this flag to be OFF and use it to enable HMI communication. But this flag only can be used to enable HMI communication when system cancels HMI communication automatically. It cannot be used to turn off HMI communication directly.

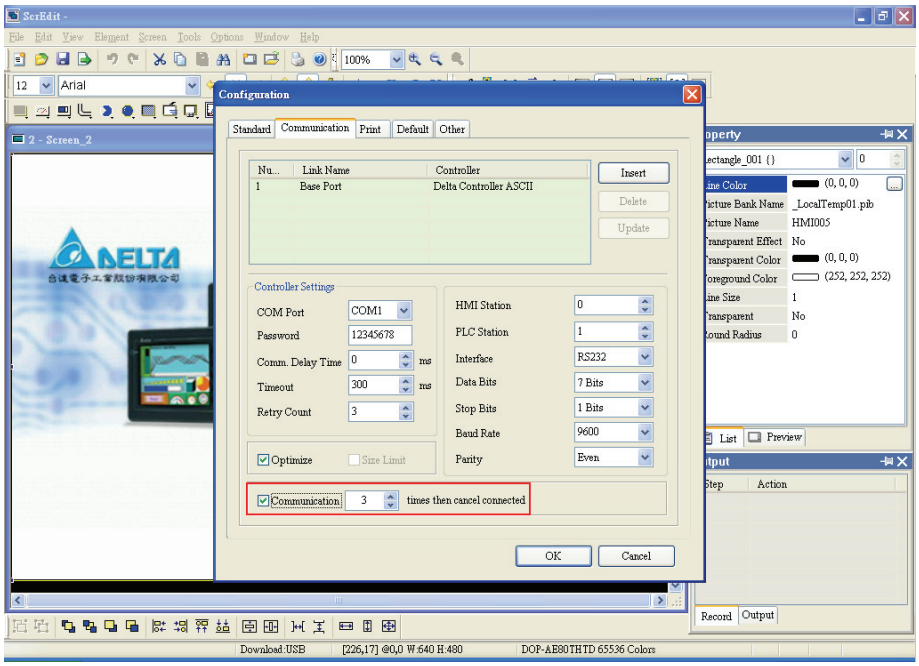


Fig. 5.1.1 Communication tab

■ Enable / Disable Back Light

Control HMI back light. When Bit 1 is set to ON, it will turn off HMI back light. When Bit 1 is set to OFF, it will turn on HMI back light.

■ Enable / Disable Buzzer

Control HMI buzzer. When Bit 2 is set to ON, it will turn off HMI buzzer. When Bit 2 is set to OFF, it will turn on HMI buzzer.

■ Clear Control Flag for Alarm Buffer

It is used to clear alarm buffer. Set Bit 3 to be ON to trigger this control flag. It clears alarm buffer when this flag is triggered to ON. This flag needs be set to OFF and then ON if the user wants to trigger again.

■ Clear Control Flag for Alarm Counter

It is used to clear alarm counter. Set Bit 4 to be ON to trigger this control flag. It clears alarm buffer when this flag is triggered. This flag needs to be set to OFF and then ON if the user wants to trigger again.

- **Setting User Level**

PLC can set the user level of using HMI from Bit 8, Bit 9 and Bit 10. The setting level is from level 0 to level 7. For example, when set Bit 8 to be ON, the user level is 1; when set Bit 9 to be ON, the user level is 2 and vise versa.

MSB (Most Significant Bit): Bit 10.

LSB (Least Significant Bit): Bit 8.

- **Curve Control Register (CUCR)**

Bit Number	Function
0	Curve sampling flag 1
1	Curve sampling flag 2
2	Curve sampling flag 3
3	Curve sampling flag 4
4~7	Reserved
8	Curve clear flag 1
9	Curve clear flag 2
10	Curve clear flag 3
11	Curve clear flag 4
12~15	Reserved

- **Curve Sampling Control Flag (1-4)**

HMI provides four curve sampling flags and four curve clear flags. HMI curve (general trend graph or X-Y chart) sampling is controlled by PLC. When this control flag is triggered to ON (Bit 0 ~ Bit 3 is set to ON), HMI will sample ONCE by reading continuous data of curve on HMI screen and convert the data to graph and show on HMI screen. Since the flag is only used to trigger the graphs and charts to be displayed or cleared, the same one flag can be used repeatedly for other trend graphs or X-Y charts. This flag needs be set to OFF and then ON if the user wants to trigger again.

- **Curve Clear Control Flag (1-4)**

Clear HMI curve (general trend graph or X-Y chart) when this control flag is triggered (Bit 8 ~ Bit 11 is set to ON). This flag needs be set to OFF and then ON if the user wants to trigger again.

- **Register for Sampling History Buffer (HBSR)**

For the settings of sampling history buffer, the user can refer to the description of “History Setup” in Chapter 2. HMI provides 12 records for tracking sampling register of history buffer. Besides, HMI time interval settings, sampling or clearing history buffer can be controlled via PLC.

Bit Number	Function
0	Control flag for Sampling History Buffer 1
1	Control flag for Sampling History Buffer 2
2	Control flag for Sampling History Buffer 3

Bit Number	Function
3	Control flag for Sampling History Buffer 4
4	Control flag for Sampling History Buffer 5
5	Control flag for Sampling History Buffer 6
6	Control flag for Sampling History Buffer 7
7	Control flag for Sampling History Buffer 8
8	Control flag for Sampling History Buffer 9
9	Control flag for Sampling History Buffer 10
10	Control flag for Sampling History Buffer 11
11	Control flag for Sampling History Buffer 12
12~15	Reserved

■ **Control Flag Register for Sampling History Buffer**

Controls sampling history buffer operation of HMI by the external controller, i.e. PLC. It will sample 1 time once the control flag is triggered to ON (Bit 0 ~ Bit 11 is set to ON). This flag needs be set to OFF and then ON if the user wants to trigger again.

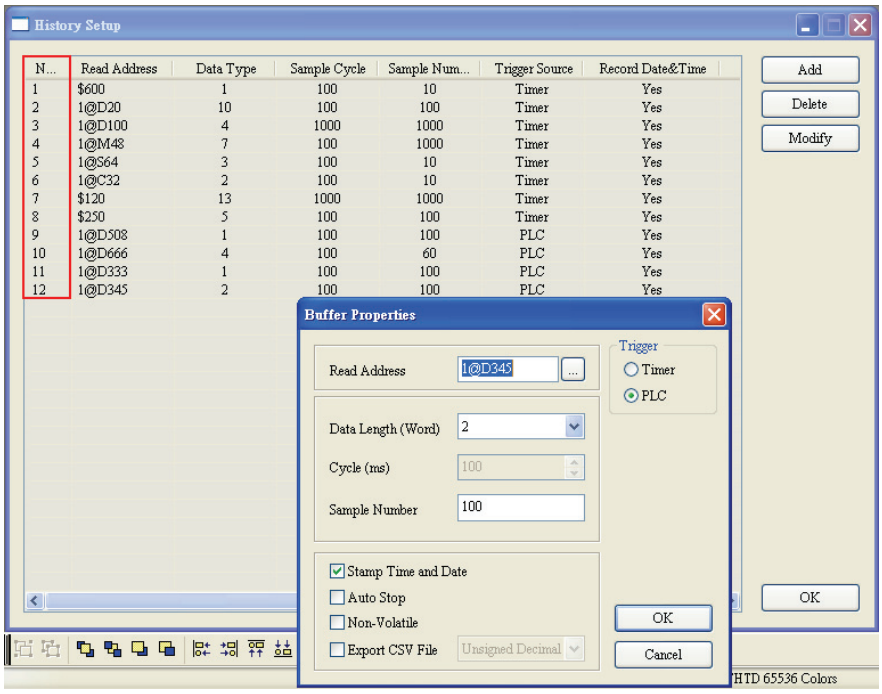


Fig. 5.1.2 History Buffer Setup

■ **Register for Clearing History Buffer (HBCR)**

Bit Number	Function
0	Clear flag of history buffer 1
1	Clear flag of history buffer 2
2	Clear flag of history buffer 3
3	Clear flag of history buffer 4
4	Clear flag of history buffer 5
5	Clear flag of history buffer 6

Bit Number	Function
6	Clear flag of history buffer 7
7	Clear flag of history buffer 8
8	Clear flag of history buffer 9
9	Clear flag of history buffer 10
10	Clear flag of history buffer 11
11	Clear flag of history buffer 12
12~15	Reserved

- **Clear Flag of History Buffer**

HMI history buffer (Fig. 5.1.2) can be cleared by the external controller, i.e. PLC. Once the control flag is triggered to ON (Bit 0 ~ Bit 11 is set to ON), it will clear HMI history buffer ONCE. This flag needs be set to OFF and then ON if the user wants to trigger again.

- **Recipe Control Register (RECR)**

Bit Number	Function
0	Recipe number change
1	Read recipe (PLC → HMI)
2	Write recipe (HMI → PLC)
3	Recipe group number change
4~7	Reserved
8~15	Designate change recipe group number

- **Control Flag for Changing Recipe Number**

There are two kinds of methods for changing and calling recipe number. One method is to use HMI internal register, RCPNO directly. RCPNO is the internal system register used for designating recipe number. The other method is to use Recipe Control Register (RECR) (Dn+5). When the user wants to change HMI recipe number, i.e. RCPNO value through control block settings, first, it needs to write recipe number (N) into Designated Recipe Number Register (RBIR) (Dn+6, please refer to the explanation of Register for Designating Recipe Number (RBIR)) and use this control flag to trigger Bit 0 of Dn+5 to be ON. After setting, RCPNO will be changed to N automatically. This flag needs be set to OFF and then ON if the user wants to trigger again.

- **Control Flag for Reading Recipe**

The user can change the recipe value of PLC by triggering this control flag (Bit 1 is set to ON). Before reading a recipe from PLC, the user should designate the recipe number (N) first (Please refer to the section "Control Flag for Changing Recipe Number"). Then, trigger this control flag to ON (Bit 1 is set to ON). After setting, the recipe will be read from PLC and stored in designating area of HMI. This flag needs be set to OFF and then ON if the user wants to trigger again.

■ **Control Flag for Writing Recipe**

Before writing a recipe to PLC, the user should designate the recipe number (N) first (Please refer to the section "Control Flag for Changing Recipe Number"). Then, trigger this control flag to ON (Bit 2 is set to ON). After setting, the recipe will be written to PLC. This flag needs be set to OFF and then ON if the user wants to trigger again.

■ **Control Flag for Changing Recipe Group Number**

There are two kinds of methods for changing and calling recipe group number. One method is to use HMI internal register, RCPG directly. RCPG is the internal system register used for designating recipe group number. The other method is to use Recipe Control Register (RECR) (Dn+5). When the user wants to change HMI recipe group number through control block settings, first, it needs to write recipe group number (N) into the high byte of this control block and use this control flag to trigger, Dn+5 (Bit 3 is set to ON). After setting, RCPG will be changed to N automatically. This flag needs be set to OFF and then ON if the user wants to trigger again.

■ **Register for Designating Recipe Number (RBIR)**

Word	Function
0	Designate receipt number which the user wants to change

By writing recipe group number (N) into Designated Recipe Number Register (RBIR), RCPNO value can be changed. The user can use the control flag for changing recipe number of Recipe Control Register (RECR) to write recipe group number (N) into Designated Recipe Number Register (RBIR) and change RCPNO value.

■ **System Control Flag Register (SCFR)**

Bit Number	Function
0	Multi-language setting value Bit 0
1	Multi-language setting value Bit 1
2	Multi-language setting value Bit 2
3	Multi-language setting value Bit 3
4	Multi-language setting value Bit 4
5	Multi-language setting value Bit 5
6	Multi-language setting value Bit 6
7	Multi-language setting value Bit 7
8	Printer flag
9	Printer form feed flag
10~15	Reserved

■ **Multi-Language Setting Value**

Store the designating multi-language setting value into this register and command HMI to switch to the

designating language according to the settings in this register. Up to 8 different kinds of languages is provided for the user selection. The language can be switched through the setting value of this register. The setting value can be within 0 ~ 255 (Fig. 5.1.3).

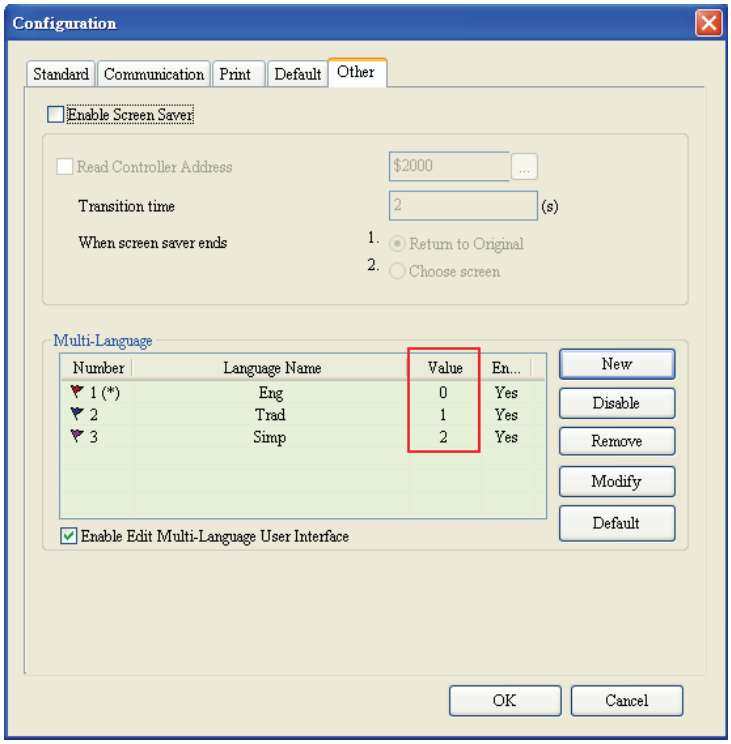


Fig. 5.1.3 Multi-Language Setting Value

■ Printer Flag

This printer flag can be used to print general current screen or print typesetting screen. Either one of them can be selected. The default setting is print typesetting screen usually. When this flag is triggered to ON, the general current screen or print typesetting screen shown on HMI display can be printed out. When this flag is set to OFF, the printer function is disabled.

■ Printer Form Feed Flag

When this flag is triggered to ON, the printer will retract the paper and align the paper for the next run automatically. When this flag is set to OFF, the printing form feed function is disabled.

NOTE

1) The printer function is not provided in all DOP series HMI product. For more detailed information, please refer to Delta HMI catalogue.

5.2 Status Block

For two-way communication and display screen between DOP series and all brands' PLC, it needs to input starting address of response register in status block. The status block in DOP series HMI is a continuous data block, such as Dm=D10 (length is 8 WORDs = D10-D17). When the control block size is set to 0, the control block function is disabled. If the control block function is disabled, the status block function is also disabled. When the status block function is enabled, the external controller, i.e. PLC can know the status of HMI by writing the setting in status block. But, please note that the address of control block and status block cannot be the same.

The function and explanation of each WORD are listed below. (In the following table, we assume that the user will use a Delta PLC, so the available starting addresses in control block are Dm ~ Dm+7 (D10 ~ D17).)

Word Number	Register	
0	Status Register for General Control (GCSR)	Dm (D10)
1	Status Register for Screen Number (SNSR)	Dm+1 (D11)
2	Status Register for Curve Control (CCSR)	Dm+2 (D12)
3	Status Register for Sampling History Buffer (HSSR)	Dm+3 (D13)
4	Status Register for Clearing History Buffer (HCSR)	Dm+4 (D14)
5	Recipe Status Register (RESR)	Dm+5 (D15)
6	Status Register for Recipe Number (RBSR)	Dm+6 (D16)
7	Status Register 2 for General Control (GCSR2)	Dm+7 (D17)

- **Status Register for General Control (GCSR)**

Bit Number	Function
0	Screen Switch Status
1~2	Reserved
3	Clear Status of Alarm Buffer
4	Clear Status of Alarm Counter
5-7	Reserved
8	User Level (Bit0)
9	User Level (Bit1)
10	User Level (Bit2)
11~15	Reserved

- **Screen Switch Status**

When the screen is switched, the Bit will be set to ON. After screen switch is completed, the Bit will be OFF.

- **Clear Status of Alarm Buffer**

When HMI clear the alarm buffer (clear status of alarm buffer function is enabled), the Bit will be set to ON. After this function is completed, the Bit will be OFF.

- **Clear Status of Alarm Counter**

When HMI clear the alarm counter (clear status of alarm counter function is enabled), the Bit will be set to ON. After this function is completed, the Bit will be OFF.

- **User Level Status**

Bit 8 ~ Bit 10 are used to record the user level when HMI is in communication.

Bit / User Level	Bit 8	Bit 9	Bit 10
0	OFF	OFF	OFF
1	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF
5	ON	OFF	ON
6	ON	ON	OFF
7	ON	ON	ON

- **Status Register for Screen Number (SNSR)**

Word	Function
0	The last open screen number

- **The last open screen number**

The register SNSR (Dm+1) is used to store the last screen number you opened. Every time the screen is switched, the last screen that the user opens (including sub-screen) will be memorized and stored in this status register (D11).

- **Status Register of Curve Control (CCSR)**

Bit Number	Function
0	Sampling status of curve 1
1	Sampling status of curve 2
2	Sampling status of curve 3
3	Sampling status of curve 4
4~7	Reserved
8	Clear status of curve 1
9	Clear status of curve 2
10	Clear status of curve 3
11	Clear status of curve 4
12~15	Reserved

- **Curve Sampling Status Flag**

When sampling general trend graph or X-Y chart, the curve sampling status flag will be set to be ON (Bit 0 ~ Bit 3 is set to ON). After sampling operation is completed, the curve sampling status flag will be OFF.

- **Curve Clear Status Flag**

When clearing general trend graph or X-Y chart, the curve clear status flag will be set to be ON (Bit 8 ~ Bit 11 is set to ON). After clear operation is completed, the curve clear status flag will be OFF.

- **Status Register for Sampling History Buffer (HSSR)**

Bit Number	Function
0	Sampling Status of History Buffer 1
1	Sampling Status of History Buffer 2
2	Sampling Status of History Buffer 3
3	Sampling Status of History Buffer 4
4	Sampling Status of History Buffer 5
5	Sampling Status of History Buffer 6
6	Sampling Status of History Buffer 7
7	Sampling Status of History Buffer 8
8	Sampling Status of History Buffer 9
9	Sampling Status of History Buffer 10
10	Sampling Status of History Buffer 11
11	Sampling Status of History Buffer 12
12-15	Reserved

- **Sampling History Buffer Flag**

When sampling history buffer, the sampling history buffer flag will be set to be ON (Bit 0 ~ Bit 11 is set to ON). After sampling operation is completed, the sampling history buffer flag will be OFF.

- **Status Register for Clearing History Buffer (HCSR)**

Bit Number	Function
0	Clear Status of History Buffer 1
1	Clear Status of History Buffer 2
2	Clear Status of History Buffer 3
3	Clear Status of History Buffer 4
4	Clear Status of History Buffer 5
5	Clear Status of History Buffer 6
6	Clear Status of History Buffer 7
7	Clear Status of History Buffer 8
8	Clear Status of History Buffer 9

Bit Number	Function
9	Clear Status of History Buffer 10
10	Clear Status of History Buffer 11
11	Clear Status of History Buffer 12
12~15	Reserved

- **Clear History Buffer Flag**

When clearing history buffer, the clear history buffer flag will be set to be ON (Bit 0 ~ Bit 11 is set to ON). After sampling operation is completed, the clear history buffer flag will be OFF.

- **Recipe Status Register (RESR)**

Bit Number	Function
0	Change Status of Recipe Number
1	Recipe Read Status (PLC → HMI)
2	Recipe Write Status (HMI → PLC)
3~15	Reserved

- **Change Status of Recipe Number Flag**

When change status of recipe number is controlled by PLC, the change status of recipe number flag (Bit 0) is set to ON. After HMI change the status of recipe number and update the RCPNO value, the change status of recipe number flag will be OFF.

- **Recipe Read Status Flag**

When HMI read one recipe data from PLC, the recipe read status flag (Bit 1) is set to ON. When the recipe data is read and saved in HMI completely, the recipe read status flag will be OFF.

- **Recipe Write Status Flag**

When HMI send one recipe data to PLC, the recipe write status flag (Bit 2) is set to ON. When the recipe data is sent and written to PLC completely, the recipe write status flag will be OFF.

- **Status Register for Recipe Number (RBSR)**

Word	Function
0	Current recipe number

When recipe number register RCPNO is changed (no matter it is changed by PLC or HMI), the status register for recipe number (RBSR) (Dm+6) will be updated also. Monitoring this status register for recipe number (RBSR) can know the current recipe number.

- **Status Register 2 for General Control (GCSR2)**

Bit Number	Function
0-7	Multi-language status value

Bit Number	Function
8	Printer status flag
9	Printer form feed status flag
10~15	Reserved

- **Multi-language Status Value**

The user can know the current multi-language shown on HMI from the multi-language status value.

- **Printer Status Flag**

When this flag is triggered to ON, it indicates that the printer is printing current display or editing screen. When this flag is set to OFF, the printer function is disabled.

- **Printer Form Feed Status Flag**

When this flag is triggered to ON, it indicates that the printer is retracting the paper and aligning the paper for the next run automatically. When this flag is set to OFF, the printing form feed function is disabled.

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Chapter 6 Internal Memory

- **Internal Register (R/W): $**

 Word access: $n (n: 0~65535)

 Bit access: $n.b (n: 0~65535, b: 0~15)

 Delta DOP series HMI provides 65536 16-bit internal registers ($0 ~ $65535).

- **Non-volatile Internal Register (R/W): $M**

 Word access: $Mn (n: 0~1023)

 Bit access: $Mn.b (n: 0~1023, b: 0~15)

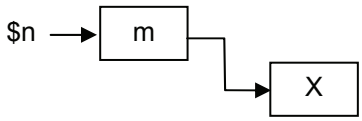
 Delta DOP series HMI provides 1024 16-bit non-volatile internal registers ($M0 ~ $M1023).

- **Indirect Address Register (R/W): *$**

 Word access: *$n (n: 0~65535)

 Indirect addressing register is the register stored in the range from the address to the internal register. The user needs to get the address from $n and then get the value stored in this address.

 *$n =

 For example, if $n = m; $m = X; then *$n = X. (the value of m cannot exceed 65535)

- **Receipt Number Register (R/W): RCPNO**

 It is 16-bit register that is used to designate the receipt group number. The minimum receipt group number should be 1 and the maximum group number is determined when editing the receipts.

 PLC upload/download will read/write a group of recipe according to the setting of recipe number register. The length of each group of receipt is determined when editing the receipts.

 Delta DOP series HMI provides a space of 64K Words max. for the user to store the receipts.

- **Receipt Register (R/W): RCP**

 The receipt length is L and the receipt group number is N.

 Word access: RCPn (n: 0~NxL+(L-1))

 Bit access: RCPn.b (n: 0~NxL+(L-1), b: 0~15)

 The recipe register is used to save the recipe that download from HMI after finishing ScrEdit.

 There are two methods to read/write these registers:

Assume that the user set's the receipt length is L and the receipt group number is N:

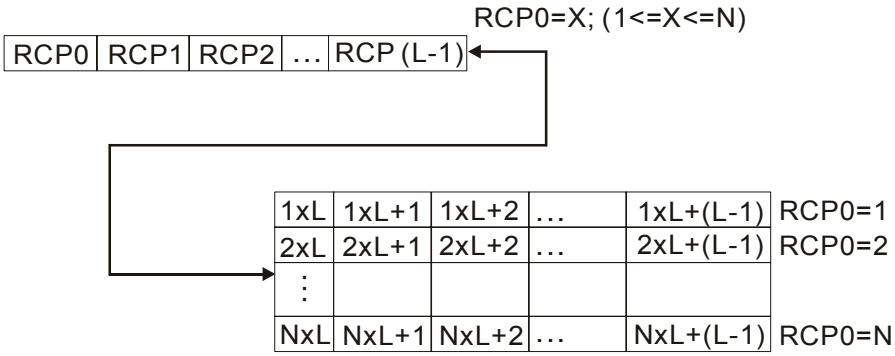
Group Address Access:

This method is accessed by RCPNO and RCP0~RCP (L-1).

For example: if RCPNO=3, HMI will read RCPNO 3 data out and save it in RCP0~RCP (L-1). Then PLC can read RCPNO 3 data from this area. RCP0~RCP (L-1) can be regarded as a common area.

Absolute Address Access:

This method is used to access the data that data address is greater than RCP (L-1). At this time, the starting address of 1st recipe is RCP (1XL), the starting address of 2nd recipe is RCP (2XL) and vise versa. Therefore, if the user's want to access the mth word of nth recipe, the user can use the equation: RCP(nxL+m) to achieve the purpose.



Chapter 7 Example Explanation

Programming MACRO files

This is for reference only. But will help the user to understand the requirements of using the HMI for controlling the VFD-E AC drive. This is a tool to help in learning how HMI programming is done.

Making a button to turn on the VFD-E AC drive

We recommend the user to use a set button for this. Most elements require an address, some a bit other's a word. The set button requires a bit setting.

Remember to compile at the end of the programming. If an error occurs it will be shown on the Output section of the Screen.

It is assumed that a Delta display kit is being used but if not just an E Drive and HMI with a power source and communication cable will be needed.

- To start, the user must first make a new file. See Fig. 7.1
- Open the Screen Edit program
- Select New
- Select the type of DOP being used. In this case 8 inch color AE type is selected.
- Base Port controller is Delta Controller ASCII.
- Drive parameter's must be set-up as follows:

 09.00 = 2: Communication Address (1to 254)

 09.01 = 3: Transmission Speed (38,400)

 09.04 = 0: Communication Protocol (7,n, 2)

 02.00 = 3: Source of First Master Frequency Command (RJ-45)

 02.01 = 4: Source of First Operation Command (RS-485 Serial communication (RJ-45)

This is for communication to the drive via RS-485 communication.

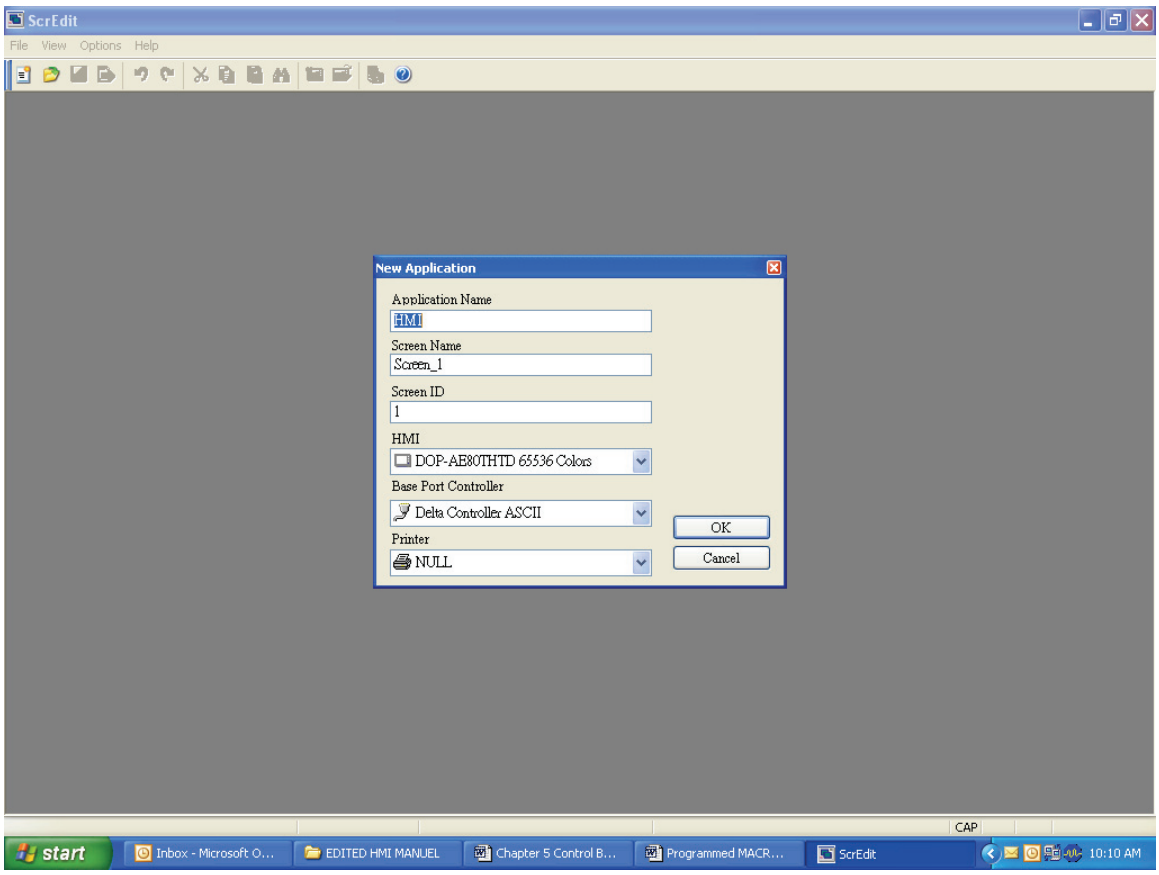


Fig. 7.1

The Screen will look like this after the user click the OK button. See Fig. 7.2

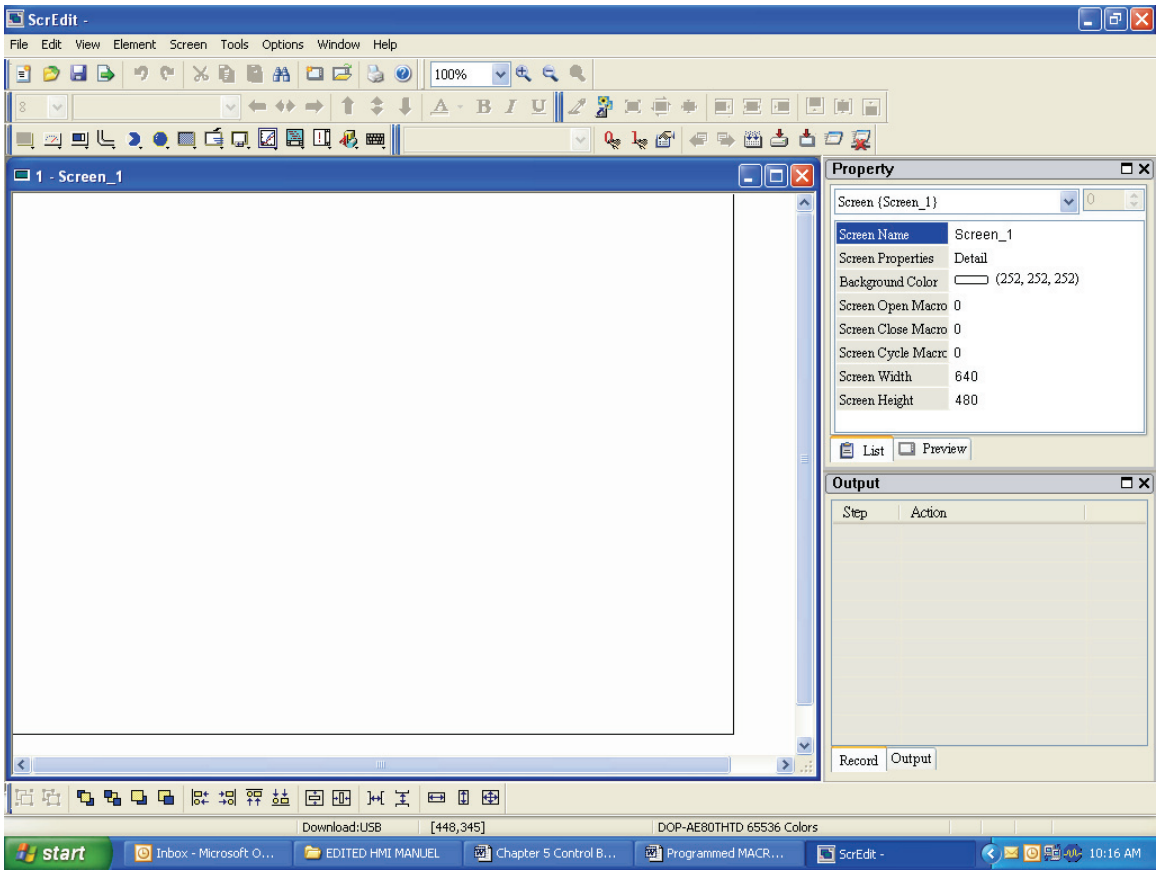


Fig. 7.2

- Select the Element drop down. Select Button, Select SET

The Screen will look like this. See Fig. 7.3

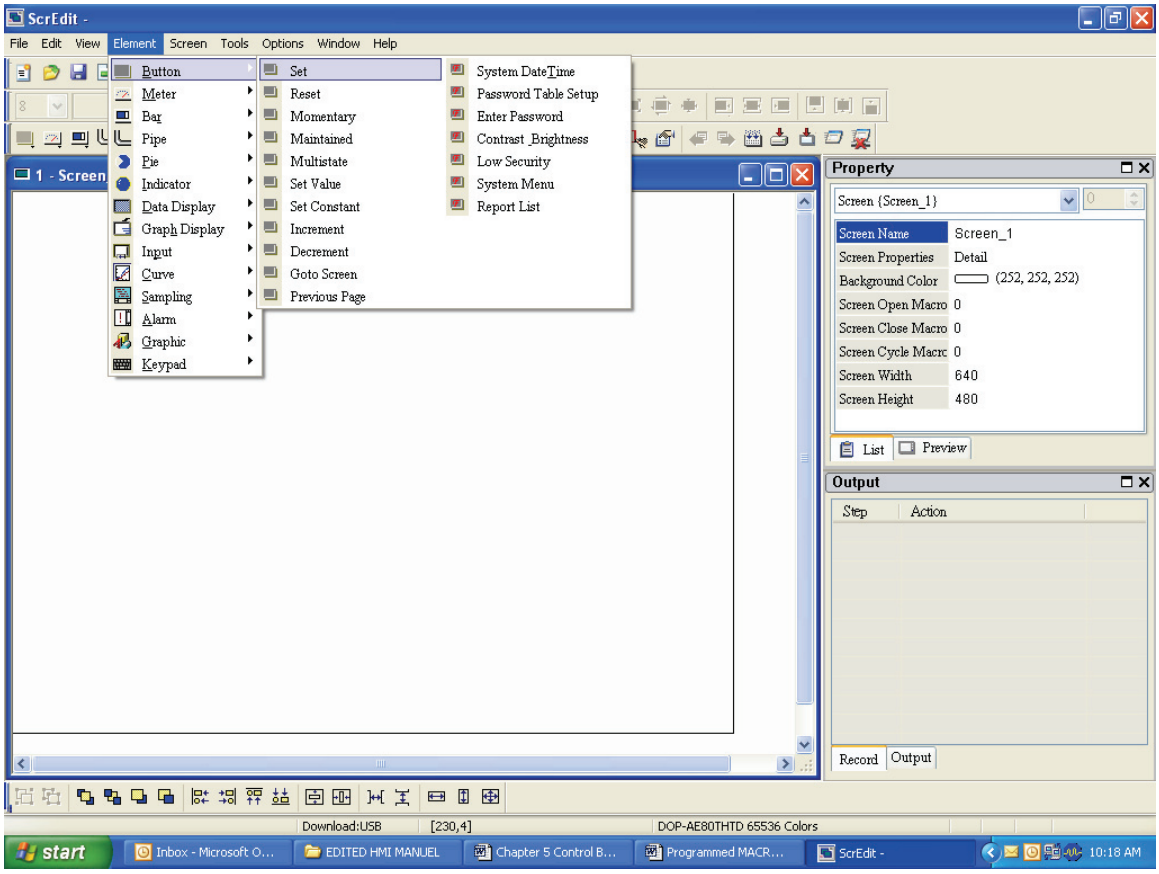


Fig. 7.3

- After that the cursor will be a +
- Left click and drag the mouse in the Screen area.

The screen will look like this after the user makes the square. See Fig. 7.4

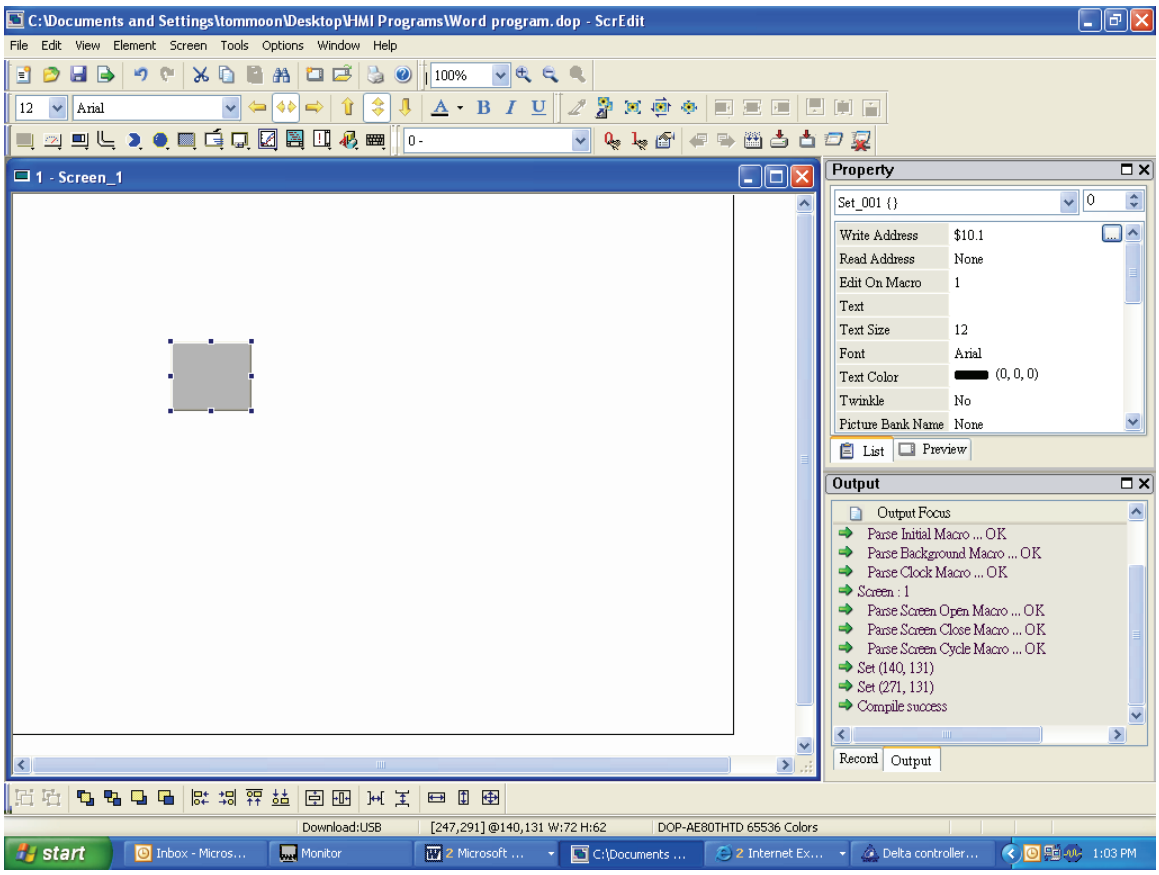


Fig. 7.4

- In the Write Address type in 10.1. See Fig. 7.5

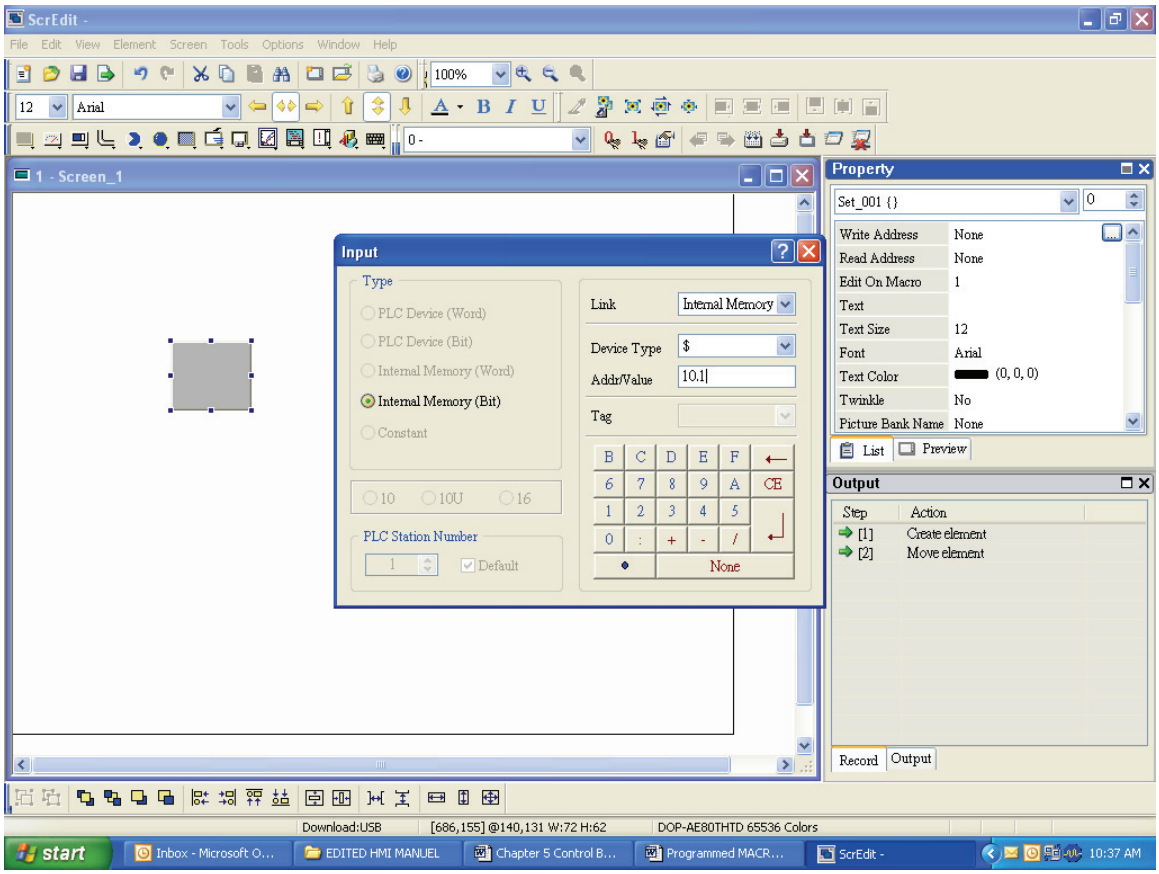


Fig. 7.5

- Select the Edit On Macro
- In the Macro section type in (2@INVERTER-2000) = 2
- This will cause the Drive to turn on when the button is selected.

The screen will look like Fig. 7.6.

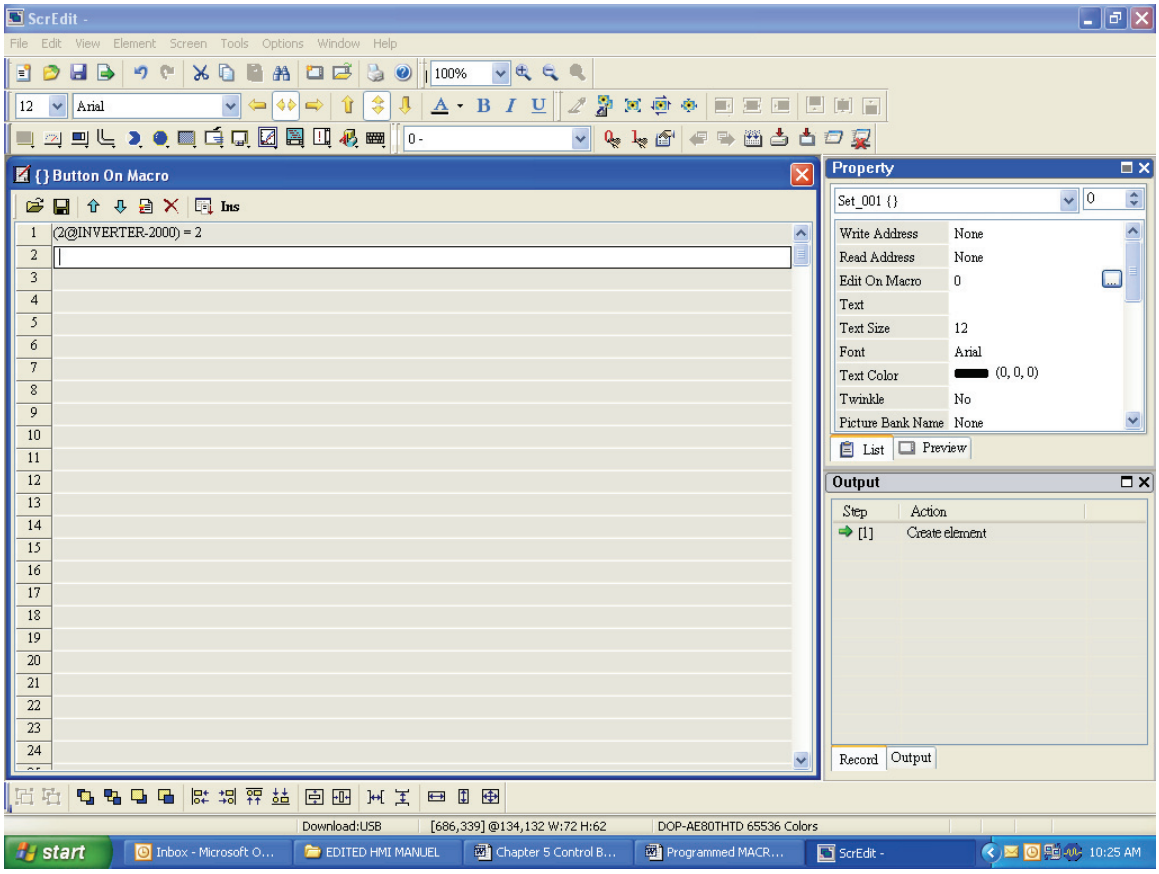


Fig. 7.6

- Go to the Screen drop down and at the bottom select Screen Cycle Macro
- Type in (2@INVERTER-0200) = 3
- Type in (2@INVERTER-0201) = 4
- This set's up the drive to accept control from the HMI via RS485 communication.

In the Screen Cycle Macro the user must set-up the Drive to accept the commands coming from the HMI.

The screen will look like Fig. 7.7.

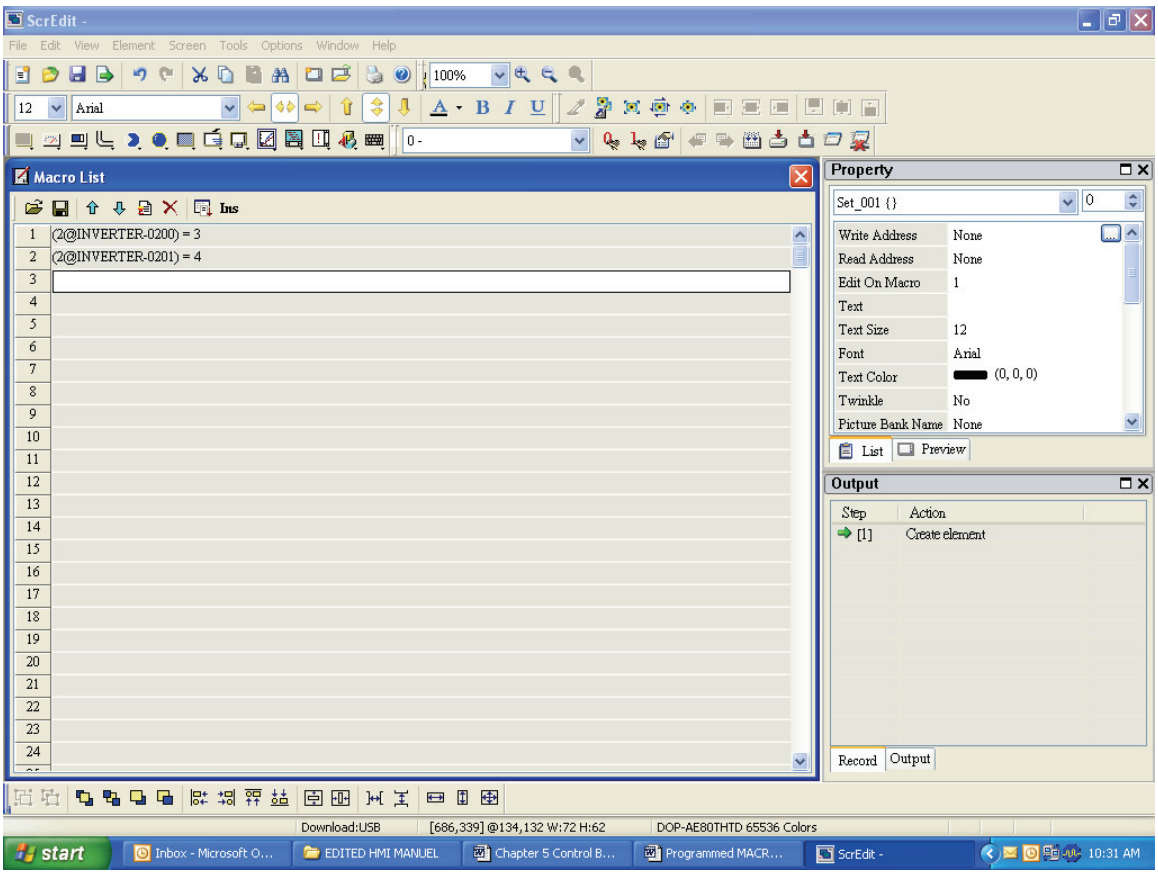


Fig. 7.7

- The Configuration of the HMI control must be set-up to control the drive.
- To do this you must set the baud rate and signaling for the HMI and the drive.
- The computer must be set-up to download the information to the HMI written in the HMI programming language.
- This set-up is 7, N, 2, 38,400, HMI 0, PLC 1, RS485 interface.
- This is done in the Configuration section of the HMI program.

The screen will look like Fig. 7.8.

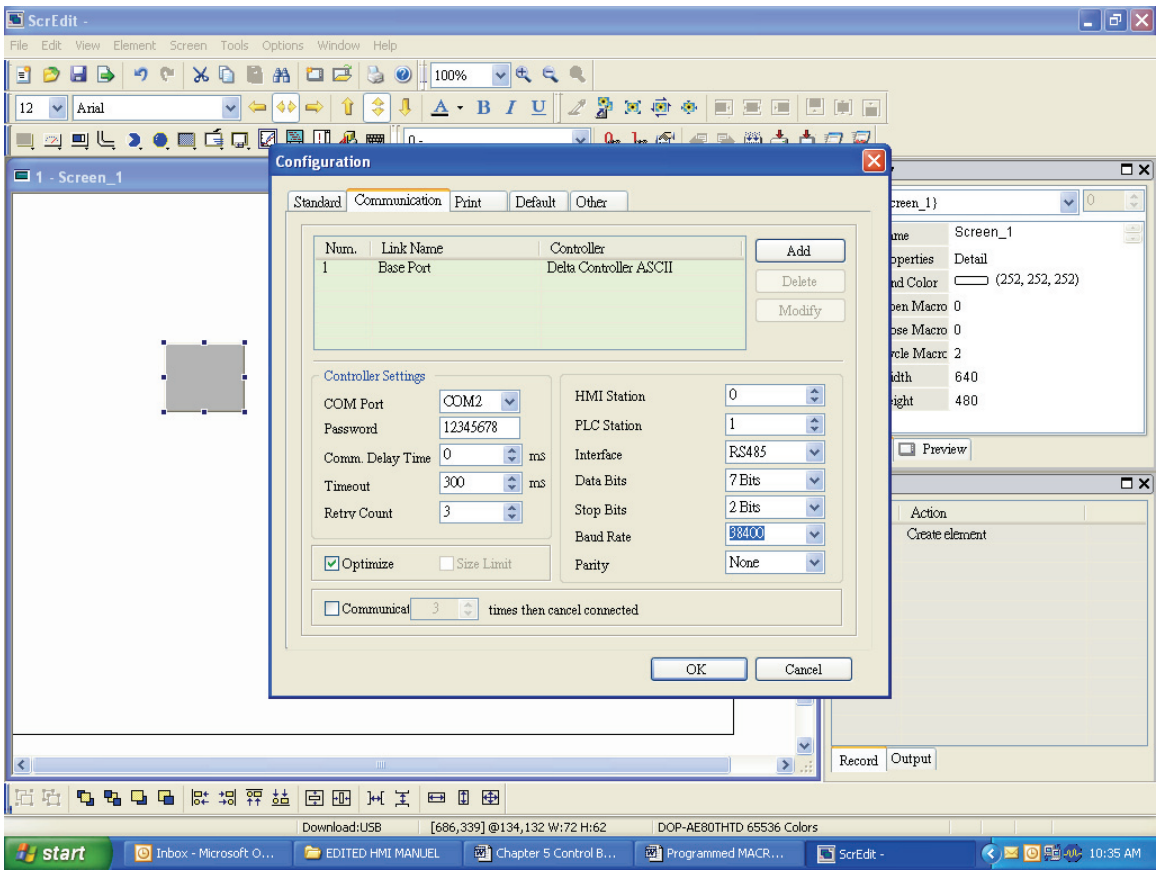

ScrEdit -
File Edit View Element Screen Tools Options Window Help
Configuration
Standard Communication Print Default Other
Num. Link Name Controller
1 Base Port Delta Controller ASCII
Add
Delete
Modify
Controller Settings
COM Port COM2
Password 12345678
Comm. Delay Time 0 ms
Timeout 300 ms
Retry Count 3
HMI Station 0
PLC Station 1
Interface RS485
Data Bits 7 Bits
Stop Bits 2 Bits
Baud Rate 38400
Parity None
Optimize
Size Limit
times then cancel connected
OK
Cancel
1 - Screen_1
Screen_1
Detail
(252, 252, 252)
Preview
Action
Create element
Record
Output
Download:USB
[686,339] @134,132 W:72 H:62
DOP-AE80THTD 65536 Colors
start
Inbox - Microsoft O...
EDITED HMI MANUEL
Chapter 5 Control B...
Programmed MACR...
ScrEdit -
10:35 AM

Fig. 7.8

Making a Stop Button with Macro's

The next button will be made to turn the drive off.

- Select the set button again.
- In the Address button select 11.0
- In the Edit on Macro section Type (2@INVERTER-2000) = 1
- This will turn off the drive

The screen will look like this. See Fig. 7.9

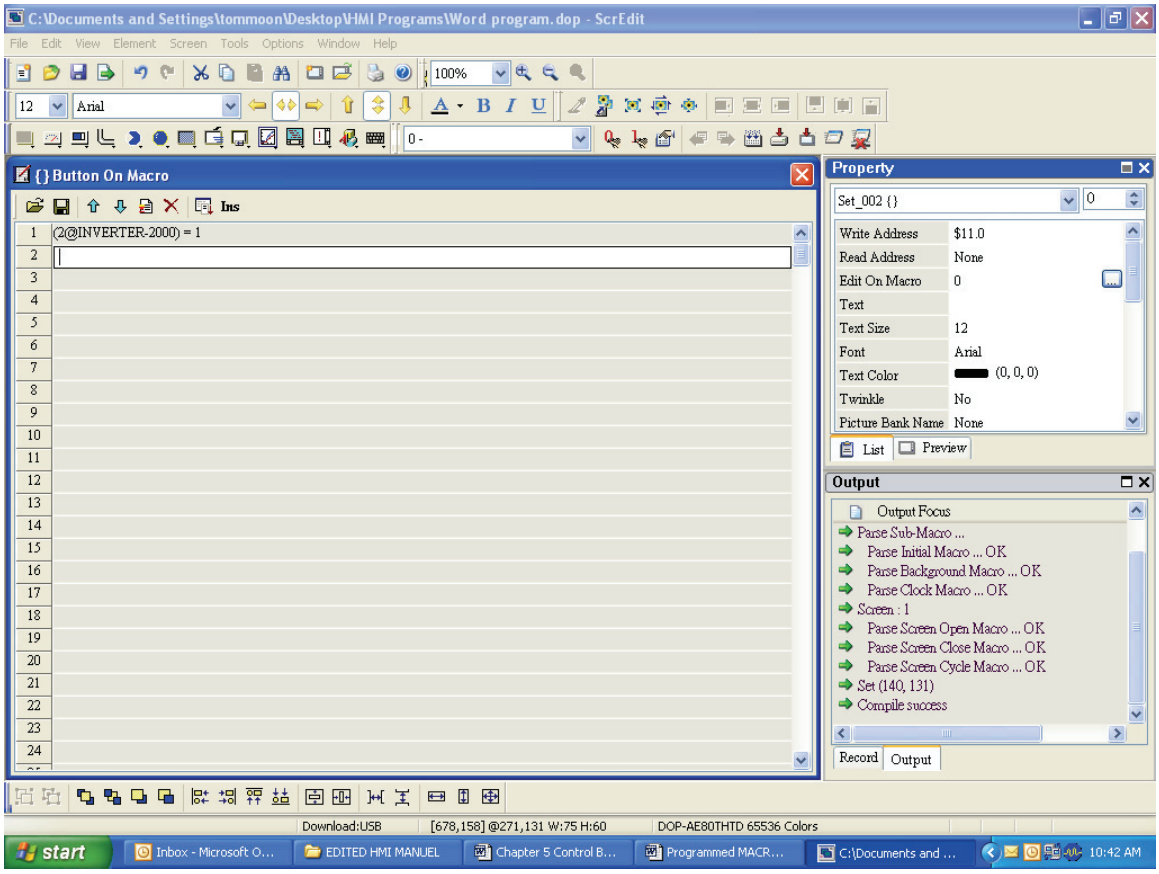


Fig. 7.9

- In the Text portion for each button type in ON and OFF for each Button then the user will see the effect when using them and know which one to select.
- Select the Icon to download it to the HMI.
- Select the Icon to compile the program.

The screen will look like this. See Fig. 7.10

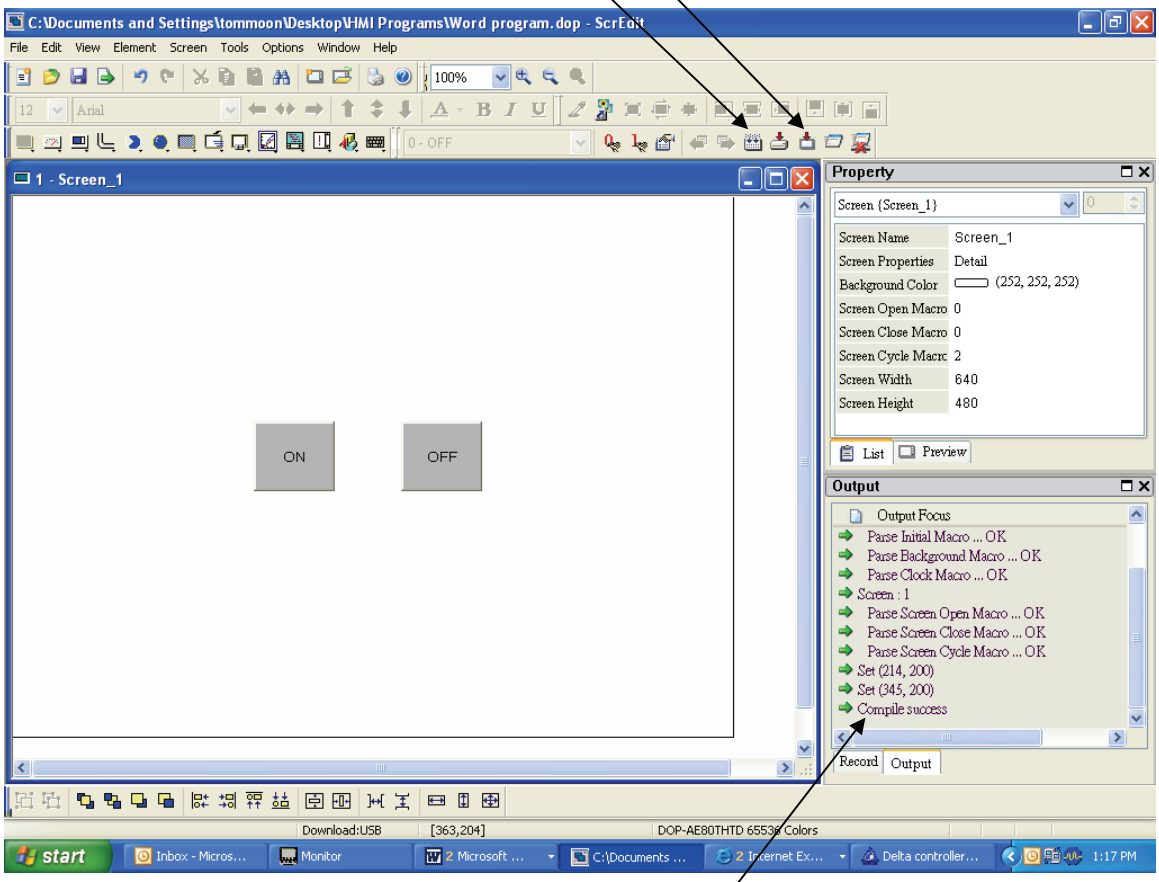


Fig. 7.10

- Note the Compile success in the Output window.
- If there is an error it will appear here.

Then try the program on the HMI screen.

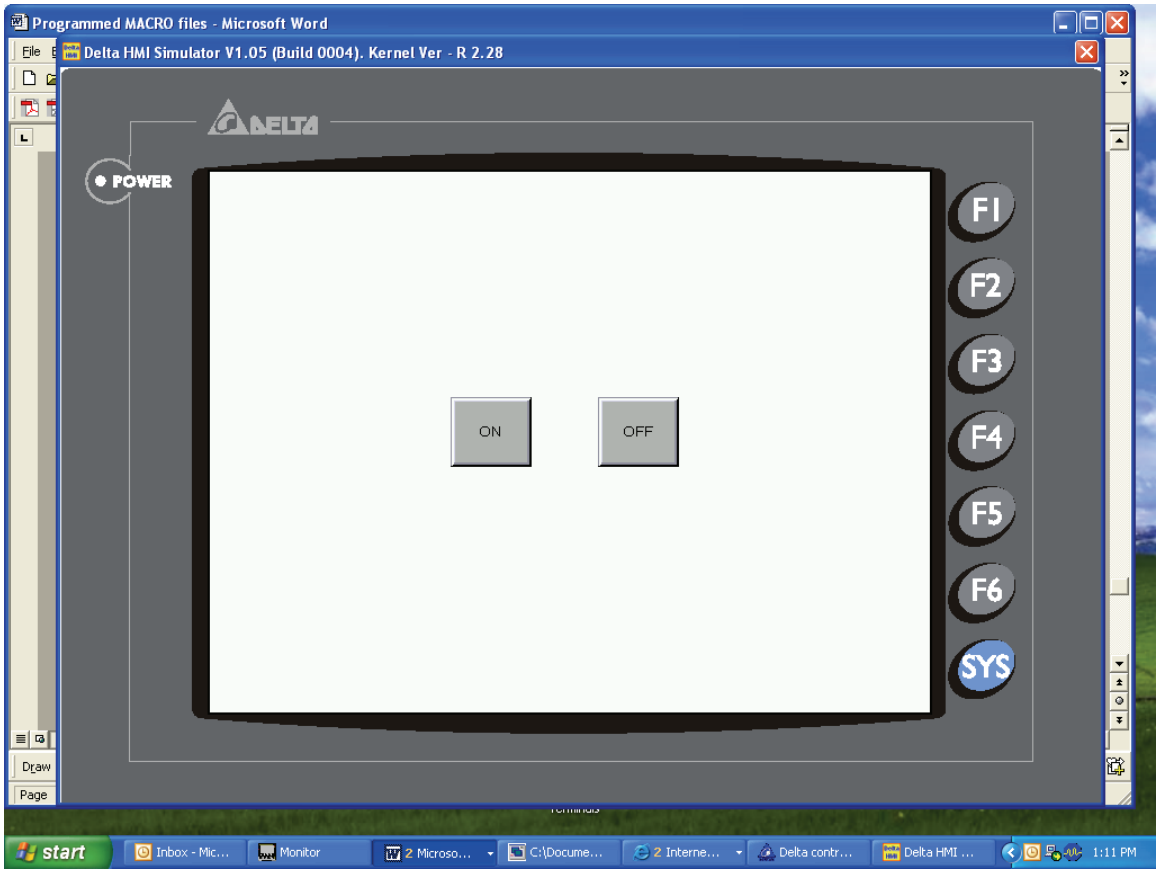

Programmed MACRO files - Microsoft Word
Delta HMI Simulator V1.05 (Build 0004). Kernel Ver - R 2.28
POWER
ON
OFF
F1
F2
F3
F4
F5
F6
SYS
Draw
Page
start
Inbox - Mic...
Monitor
2 Microso...
C:\Docume...
2 Interne...
Delta contr...
Delta HMI ...
1:11 PM

Fig. 7.11

Appendix A Specifications and Installation

A.1 Specifications

MODEL		AS38BSTD(-W)	A(E)57BSTD(-W)	A(E)57GSTD(-W)	A(E)57CSTD(-W)
Operation System		Windows Base Real Time OS			
MCU		32-bit RISC Micro-controller / 206.4MHz			
NOR Flash ROM		NOR Flash ROM 2 Mbytes (System: 1MB / User: 1MB)	NOR Flash ROM 4 Mbytes (System: 1MB / User: 1MB)		
SDRAM		4 Mbytes	16Mbytes		
Backup Memory (Bytes)		128K	A : 256K AE : 512K	A : 256K AE : 512K	A : 256K AE : 512K
EXT. Memory	SM Card		✓	✓	✓
	USB Flash Drive	✓			
Extension Interface			✓ (AE)	✓ (AE)	✓ (AE)
USB for Download [USB Client]		1 Client Ver 1.1			
USB for Data Storage / Printer [USB Host]		✓			
LCD MODULE	Display Type	3.8” STN LCD (8 shades of blue)	5.7” STN LCD (8 shades of blue)	5.7” FSTN LCD (16 shades of gray)	5.7” STN LCD (256 colors)(Note 2)
	Resolution	320 x 240 pixels			
	Back Light	LED Back Light (about 10 thousand hours at 25°C)	CCFL Back Light (about 50 thousand hours at 25°C)		
	Display Size	3.8 inches (76.8 x 57.6mm)	5.7 inches (115.17 x 86.37mm)		
Function Key		User defined key x 4			
Perpetual Calendar (RTC)		Built-in			
Cooling Method		Natural air circulation			
Safety Approval (Waterproof for front panel)		IP65 / NEMA4 / CE, UL			
Operating Temp.		0°C to 50°C			
Storage Temp.		-20°C to +60°C			
Ambient Humidity		10% ~ 90% RH [0 ~ 40°C], 10% ~ 55% RH [41 ~ 50°C]			

MODEL	AS38BSTD(-W)	A(E)57BSTD(-W)	A(E)57GSTD(-W)	A(E)57CSTD(-W)
Vibration Resistance	IEC61131-2 compliant When vibration is NOT continuous: 5Hz-9Hz 3.5mm, 9Hz-150Hz 1G When vibration is continuous: 5Hz-9Hz 1.75mm, 9Hz-150Hz 0.5G X, Y, Z directions for 10 times			
Dimensions (W) x (H) x (D) mm	140.8 x 104.8 x 44.8	184.1 x 144.1 x 47		
Weight	Approx. 315g	Approx. 768g		
Operation Voltage	DC +24V (-10% ~ +15%) (Please use isolated power supply)(Note 3)			
Backup Battery	3V lithium battery CR2032 x 1 / battery life: 5 years			
Buzzer	85dB			

NOTE

1) Only DOP-AE94BSTD this model is not UL recognized.
2) The maximum visual performance of the models with 256 colors LCD module is 256 colors. However, in order to make the created elements to be displayed with more brilliant colors, the ScrEdit software (Screen Editor, the program editor of Delta HMI product) only provides 144 colors for user settings.
3) Users please use isolated power supply except DOP-AE80THTD, DOP-AE94BSTD, DOP-AE10THTD these models.
4) Users can download the Screen Editor, the program editor of Delta HMI product and the user manual via the following link: http://www.delta.com.tw/industrialautomation/.

MODEL		A80THTD1	AE80THTD	AE94BSTD	A10TCTD AE10THTD
Operation System		Windows Base Real Time OS			
MCU		32-bit RISC Micro-controller / 206.4MHz			
NOR Flash ROM		NOR Flash ROM 8 Mbytes (System: 1MB / User: 7MB)			
SDRAM		32 Mbytes		16Mbytes	32 Mbytes
Backup Memory (Bytes)		512K	512K	512K	A：256K AE：512K
EXT. Memory	SM Card		✓		✓
	USB Disk	✓	✓	✓	✓ (AE)
Extension Interface			✓	✓	✓ (AE)
USB for Download [USB Client]		1 Client Ver 1.1			
USB for Data Storage / Printer [USB Host]		✓	✓	✓	✓ (AE)
LCD MODULE	Display Type	8” TFT LCD (65536 colors)	8” TFT LCD (65536 colors)	9.4” STN LCD (8 shades of blue)	10.4” TFT LCD (A：256 colors AE：65536 colors)
	Resolution	640 x 480 pixels			
	Back Light	2CCFL Back Light (about 50 thousand hours at 25°C)		CCFL Back Light (about 30 thousand hours at 25°C)	2CCFL Back Light (about 30 thousand hours at 25°C)
	Display Size	8 inches (162.2 x 121.7mm)	8 inches (162.2 x 121.7mm)	9.4 inches (192.0 x 144.0mm)	10.4 inches (211.2 x 158.4mm)
Function Key		User defined key x 6		User defined key x 11	User defined key x 7
Perpetual Calendar (RTC)		Built-in			
Cooling Method		Natural air circulation			
Safety Approval (Waterproof for front panel)		IP65 / NEMA4 / CE, UL (Note 1)			
Operating Temp.		0°C to 50°C			
Storage Temp.		-20°C to +60°C			
Ambient Humidity		10% ~ 90% RH [0 ~ 40°C], 10% ~ 55% RH [41 ~ 50°C]			
Vibration Resistance		IEC61131-2 compliant When vibration is NOT continuous: 5Hz-9Hz 3.5mm, 9Hz-150Hz 1G When vibration is continuous: 5Hz-9Hz 1.75mm, 9Hz-150Hz 0.5G X, Y, Z directions for 10 times			
Dimensions (W) x (H) x (D) mm		243.1 x 178.1 x 52.4	243.1 x 178.1 x 52.4	297.1 x 222.1 x 50.9	297.1 x 222.1 x 51.1
Weight		Approx. 1147g	Approx. 1147g	Approx. 1930g	Approx. 1721g

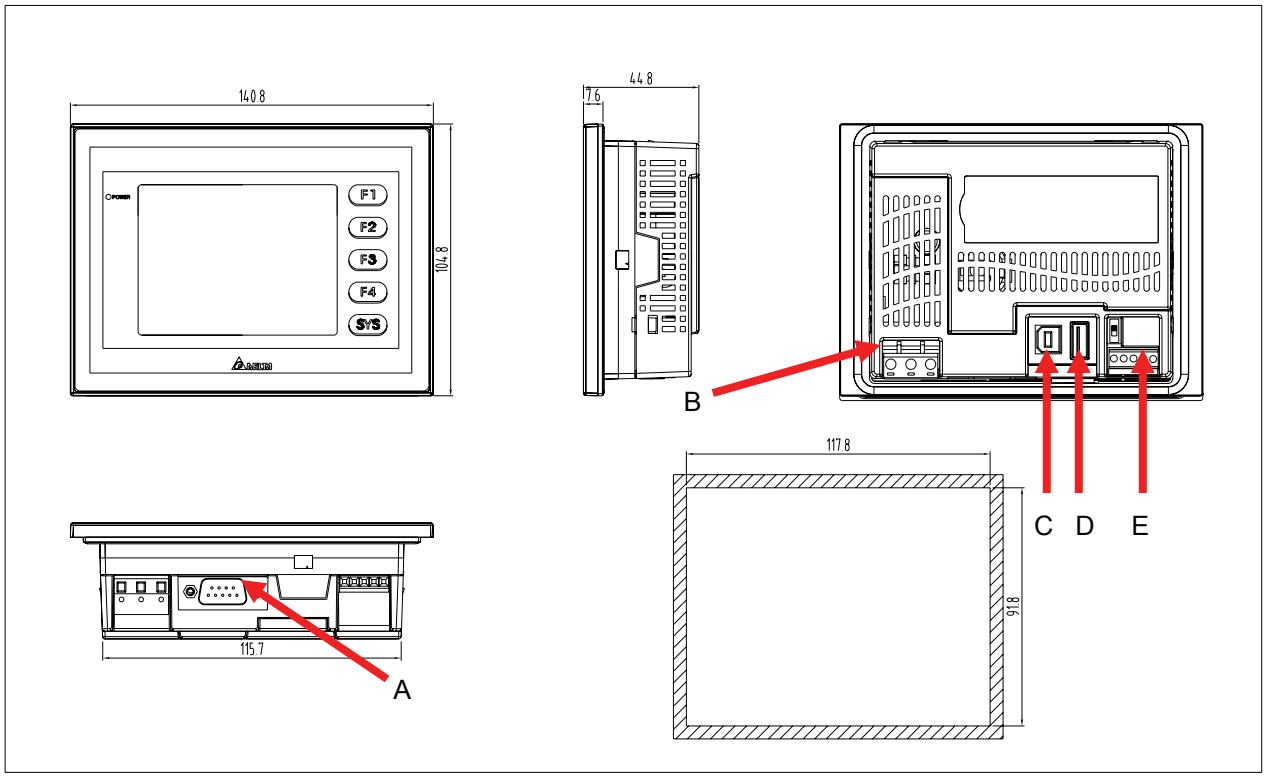
MODEL	A80THTD1	AE80THTD	AE94BSTD	A10TCTD AE10THTD
Operation Voltage	DC +24V (-10% ~ +15%) (Please use isolated power supply)(Note 3)			
Backup Battery	3V lithium battery CR2032 x 1 / battery life: 5 years			
Buzzer	85dB			

NOTE

1) Only DOP-AE94BSTD this model is not UL recognized.
2) The maximum visual performance of the models with 256 colors LCD module is 256 colors. However, in order to make the created elements to be displayed with more brilliant colors, the ScrEdit software (Screen Editor, the program editor of Delta HMI product) only provides 144 colors for user settings.
3) Users please use isolated power supply except DOP-AE80THTD, DOP-AE94BSTD, DOP-AE10THTD these models.
4) Users can download the Screen Editor, the program editor of Delta HMI product and the user manual via the following link: http://www.delta.com.tw/industrialautomation/.

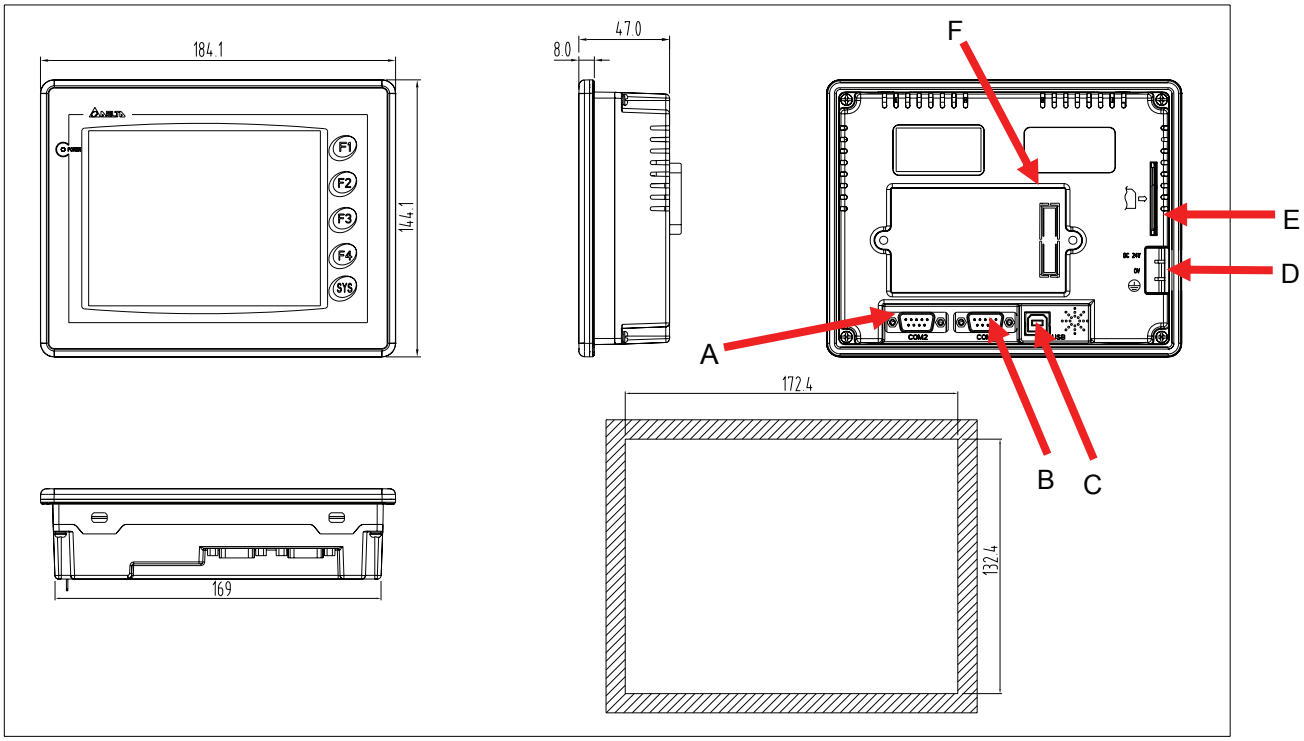
A.2 Dimensions and Profile

■ **DOP-AS38BSTD(-W)** **Units: mm**



Number	Description
A	COM1/COM3(RS232)
B	Power Input Terminal
C	USB Client
D	USB Host
E	COM2(RS422/RS485)

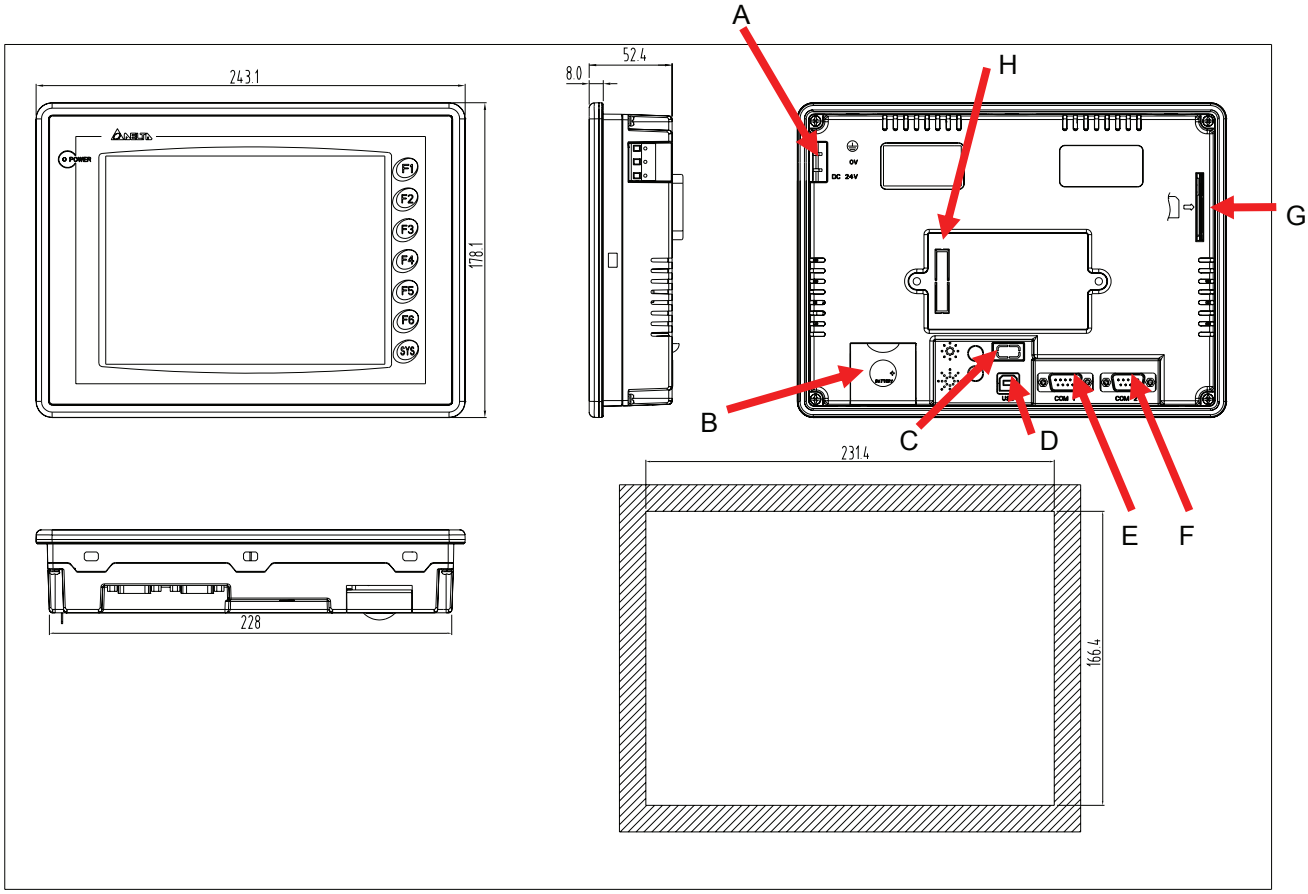
■ **DOP-A(E)57G (B)(C)STD(-W)** **Units: mm**



Number	Description
A	COM2(RS2323/RS422/RS485)
B	COM1(RS232)
C	USB Client
D	Power Input Terminal
E	Extension slot for SM Card
F	Extension slot (For AE)

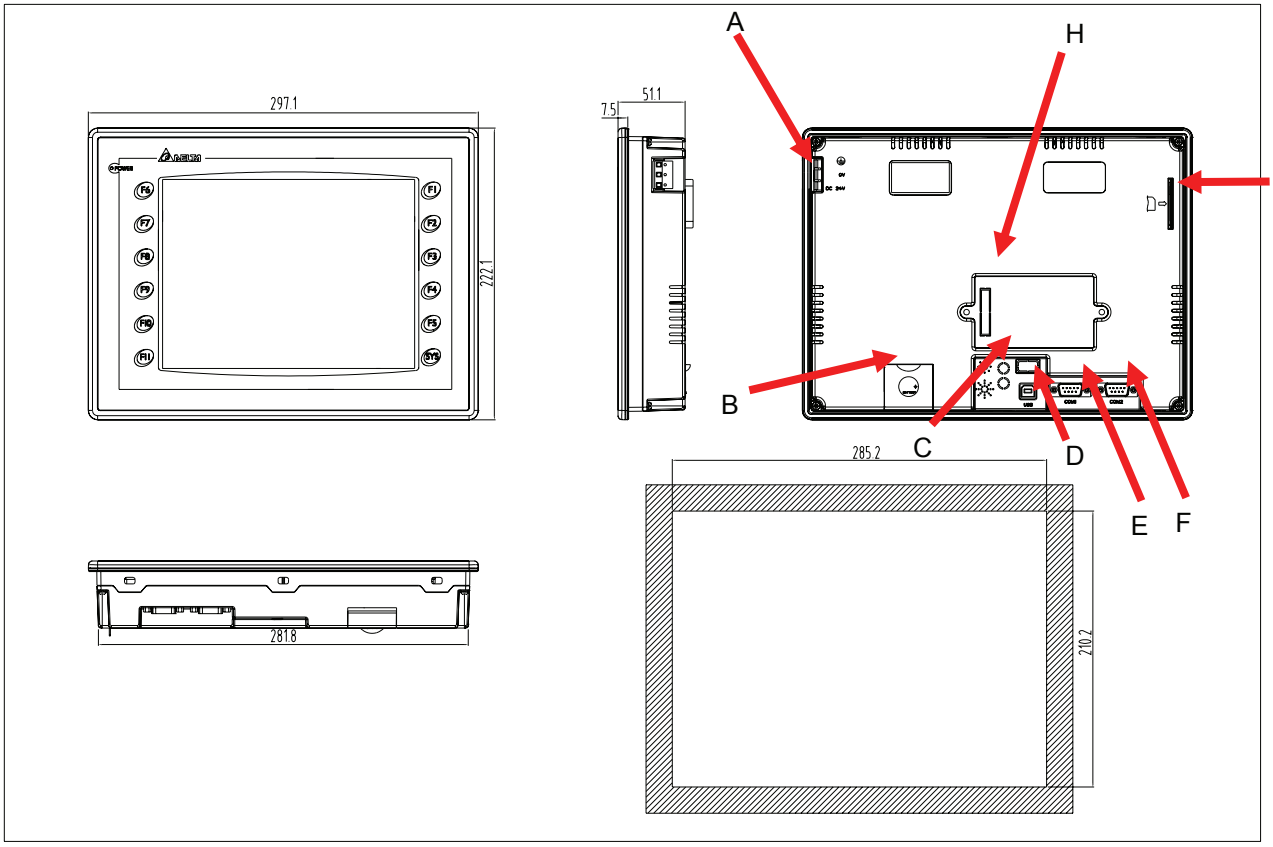
■ DOP-A80THTD1/DOP-AE80THTD

Units: mm



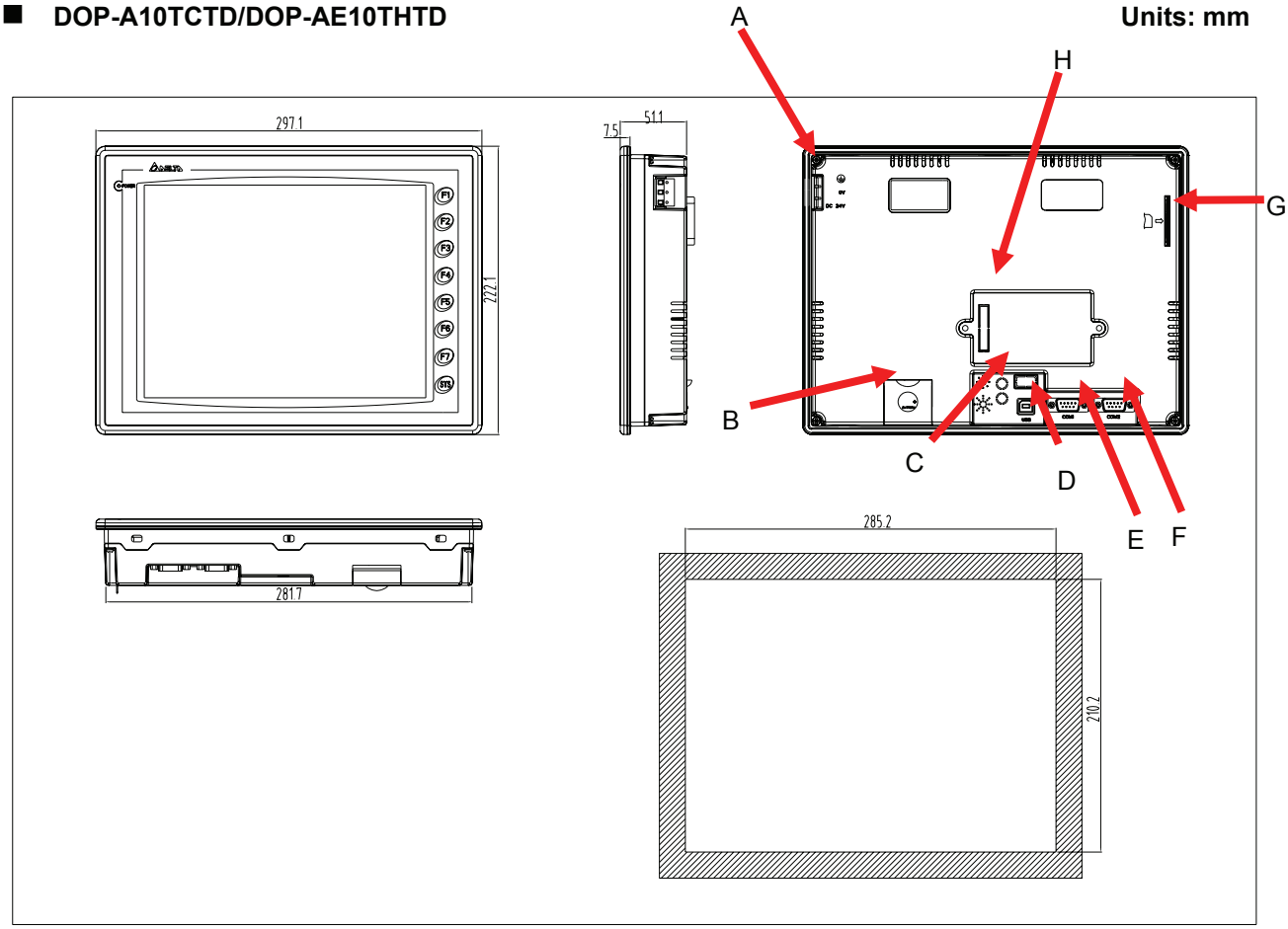
Number	Description
A	Power Input Terminal
B	Battery Cover
C	USB Host
D	USB Client
E	COM1(RS232)
F	COM2(RS2323/RS422/RS485)
G	Extension slot for SM Card
H	Extension slot (For AE)

■ **DOP-AE94BSTD** **Units: mm**



Number	Description
A	Power Input Terminal
B	Battery Cover
C	USB Host
D	USB Client
E	COM1(RS232)
F	COM2(RS2323/RS422/RS485)
G	Extension slot for SM Card
H	Extension slot (For AE)

■ **DOP-A10TCTD/DOP-AE10THTD** **Units: mm**



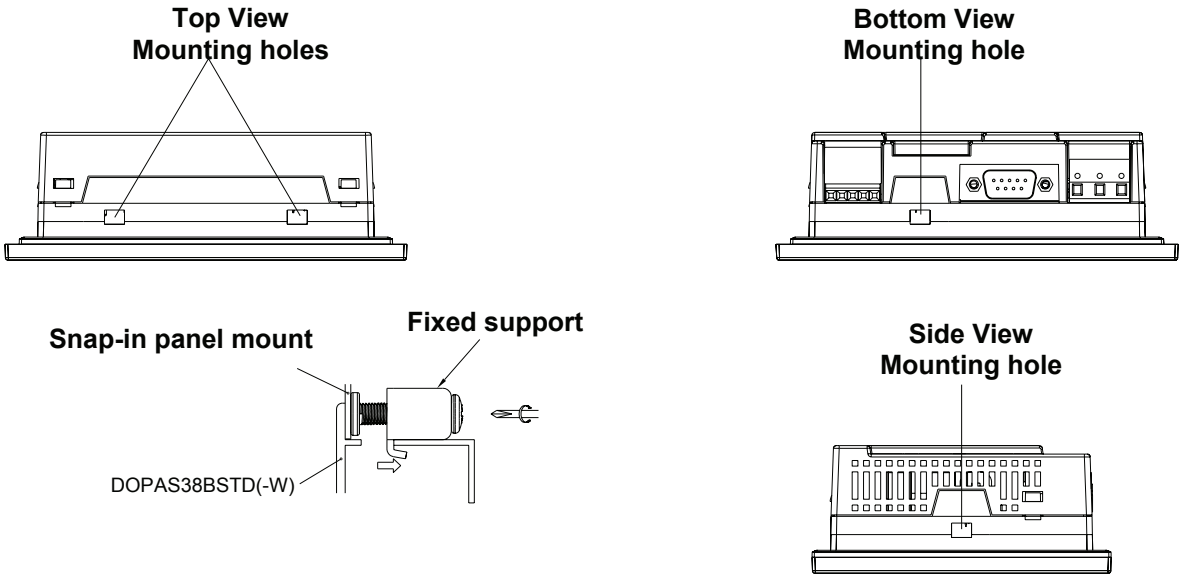
Number	Description
A	Power Input Terminal
B	Battery Cover
C	USB Host
D	USB Client
E	COM1(RS232)
F	COM2(RS2323/RS422/RS485)
G	Extension slot for SM Card
H	Extension slot (For AE)

A.3 Installation

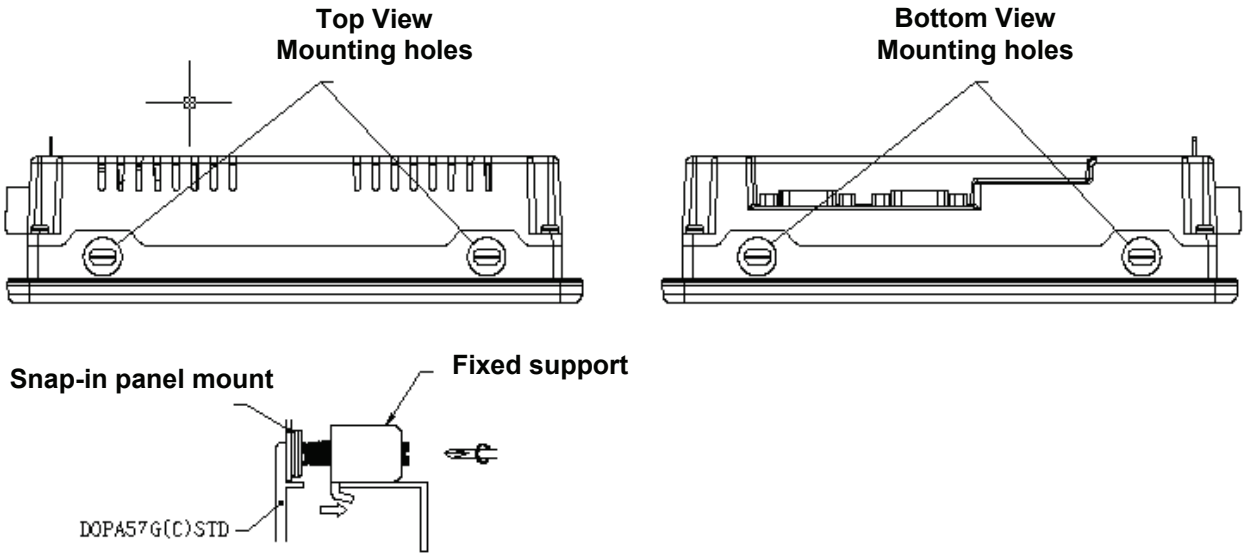
Install the fixed support from the internal side of HMI.

1. Do not turn the screw more than its torque specification to avoid damage to plastic box.
2. Damage may occur if torque exceeds 0.7N.M

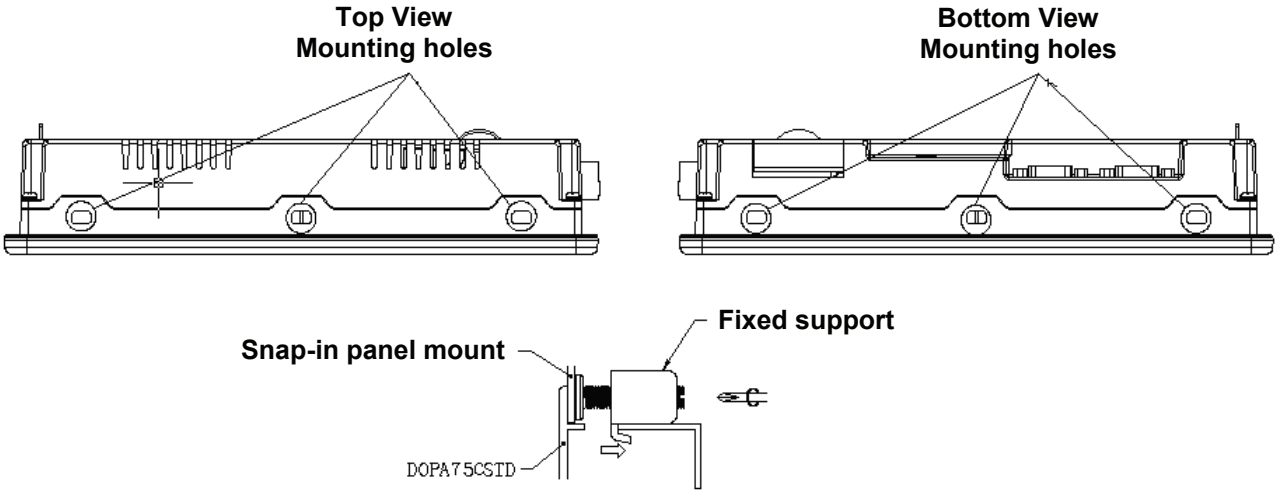
3.8" Panel (DOP-AS38BSTD(-W))



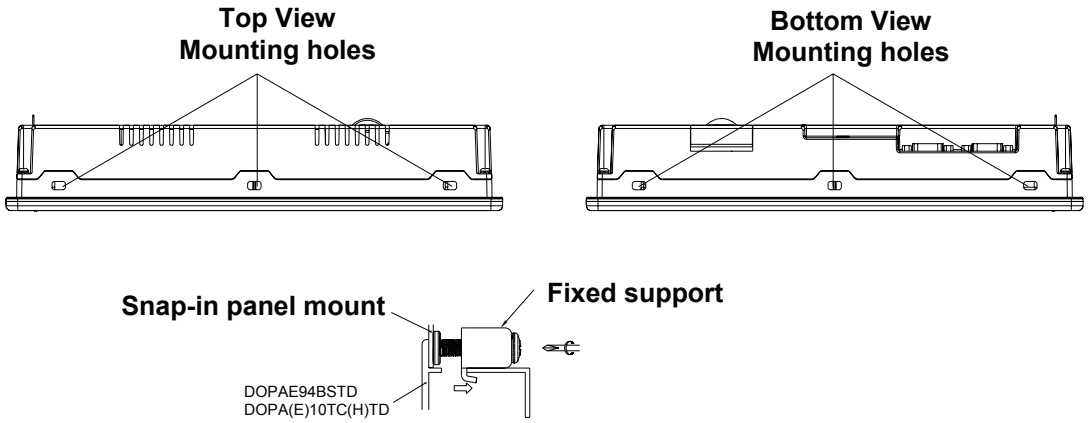
5.7" Panel (DOP-A(E)57GSTD, DOP-A(E)57CSTD,DOP-A(E)57BSTD)



8.0" Panel (DOP-A80THTD1, DOP-AE80THTD)



9.4" & 10.4"Panel (DOP-AE94BSTD, DOP-A(E)10TC(H)TD)



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Appendix B USB Flash Drive Update Function

DOP series HMI, which provides USB flash drive update function, has a built-in USB host interface. The user can connect HMI to a USB flash drive via this USB host interface and download HMI screen data and upgrade the firmware of HMI. It also provides encryption and copy times setting function to protect the data from unauthorized access or use.

There are two modes provided when copying screen data via a USB flash drive. They are Encryption mode and No Encryption mode. If Encryption mode is selected, the screen data will be encrypted and copying of the screen data is an act restricted by the copy times setting of HMI. Choosing Encryption can effectively protect the intellectual property rights and avoid the user design not to be stolen. If No Encryption mode is selected, there is no limit for copying the screen data and the user can use and download the screen data freely.

Encryption Mode

As shown as the Fig. B.1 below, before selecting Encryption mode, the user should click **Options** > **Configuration** to enter Standard tab and select "**Enable USB updating check**" this option. The encryption and copy times setting function of HMI cannot be used if this option is not selected.

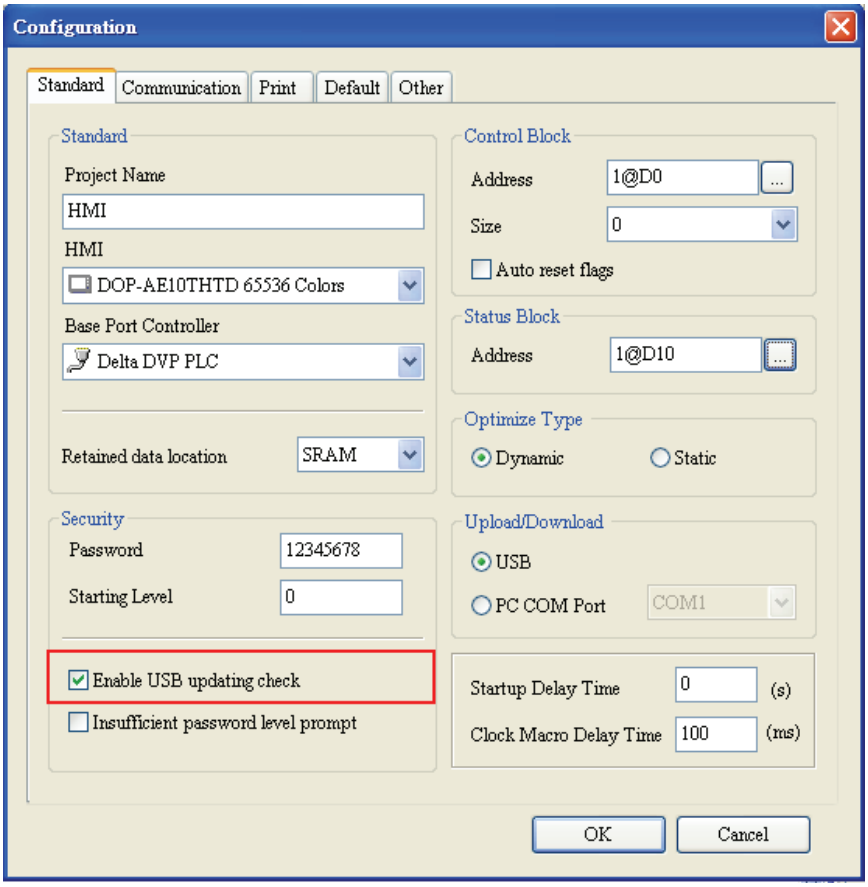


Fig. B.1

After compile operation is completed, please click **File** > **Make Ext. Memory Data** (Fig. B.2), and then system will ask you to choose the location to save the file (Fig. B.3). After pressing **OK** button, the screen data file can be created. If the user executes this function when compile operation is not completed, there will be an error message display to warn the user (Fig. B.4). If a file created previously has been existed in the location that the user designates, the dialog box shown as Fig. B.5 will pop up to remind the user and ask the user to confirm if overwrite it or not. When creating the screen data file completely, the dialog box shown as Fig. B.6 will display and tell the user the screen data has been created successfully.

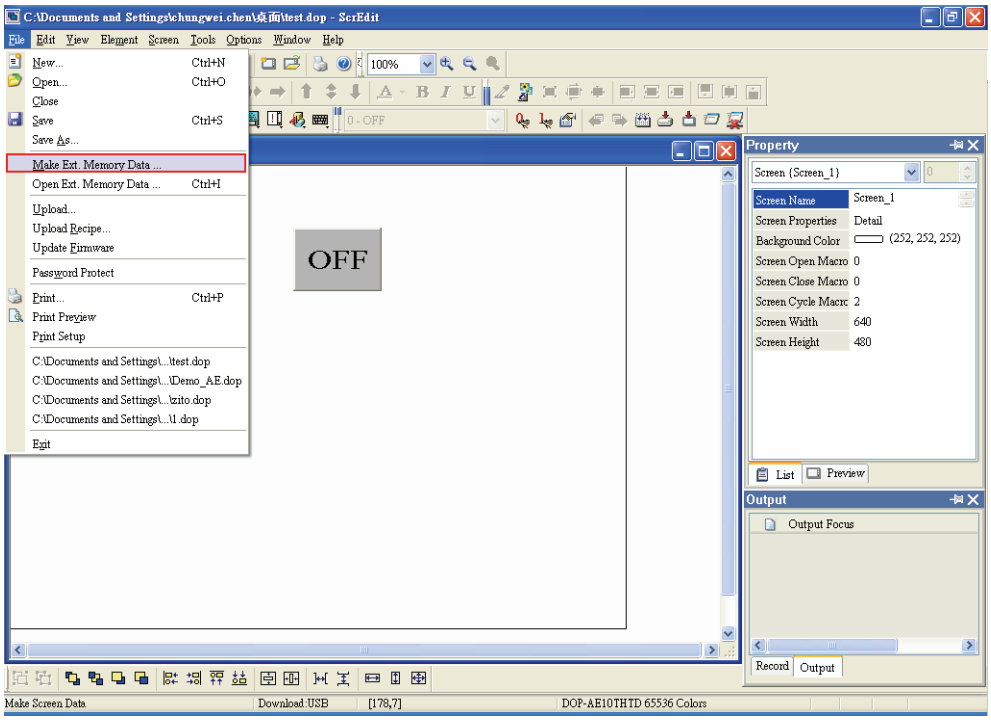


Fig. B.2

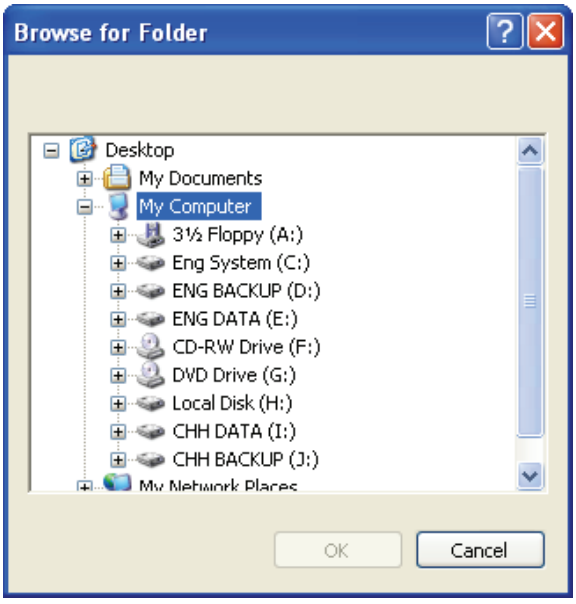


Fig. B.3

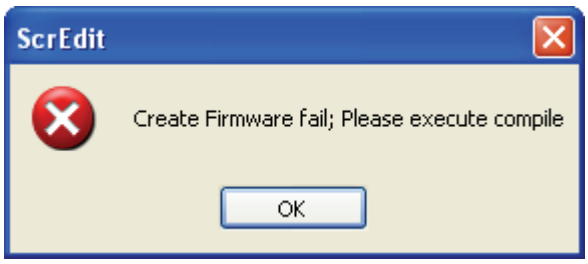


Fig. B.4

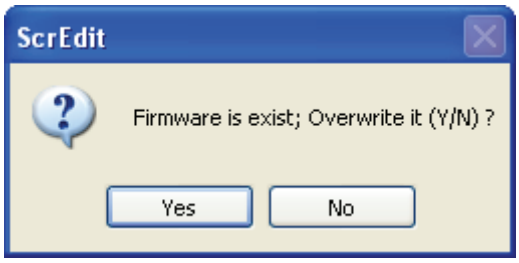


Fig. B.5

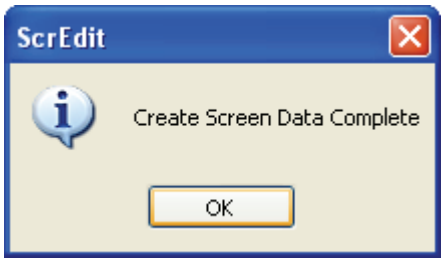


Fig. B.6



Fig. B.7

Then, connect USB flash drive to HMI. After power in connected to HMI, power on HMI and a warning dialog box will display as shown as Fig. B.7 on previous page. This warning message is used to remind the user that the data transfer and copy only can be done via USB flash drive at this time.

After pressing OK button, it will return the original HMI screen. Then, press SYS (system) key on HMI panel for three seconds and it will enter into the main menu of HMI system () (Fig. B.8). Please touch the "**File Manager**" option and enter into "**File Manager**" menu screen. When using a DOP AS series HMI, your "File Manager" menu screen will look like Fig. B.9. When using a DOP AE series HMI, your "File Manager" menu screen will look like Fig. B.10.



Fig. B.8

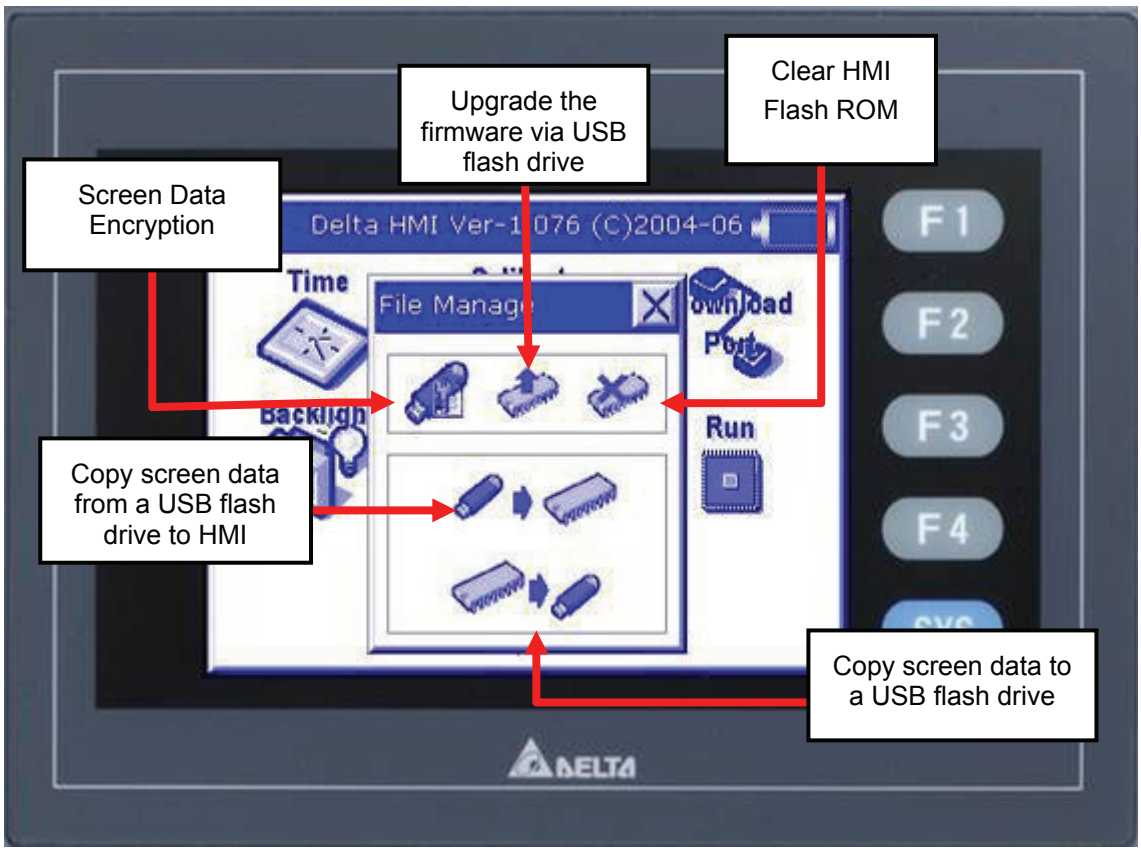


Fig. B.9

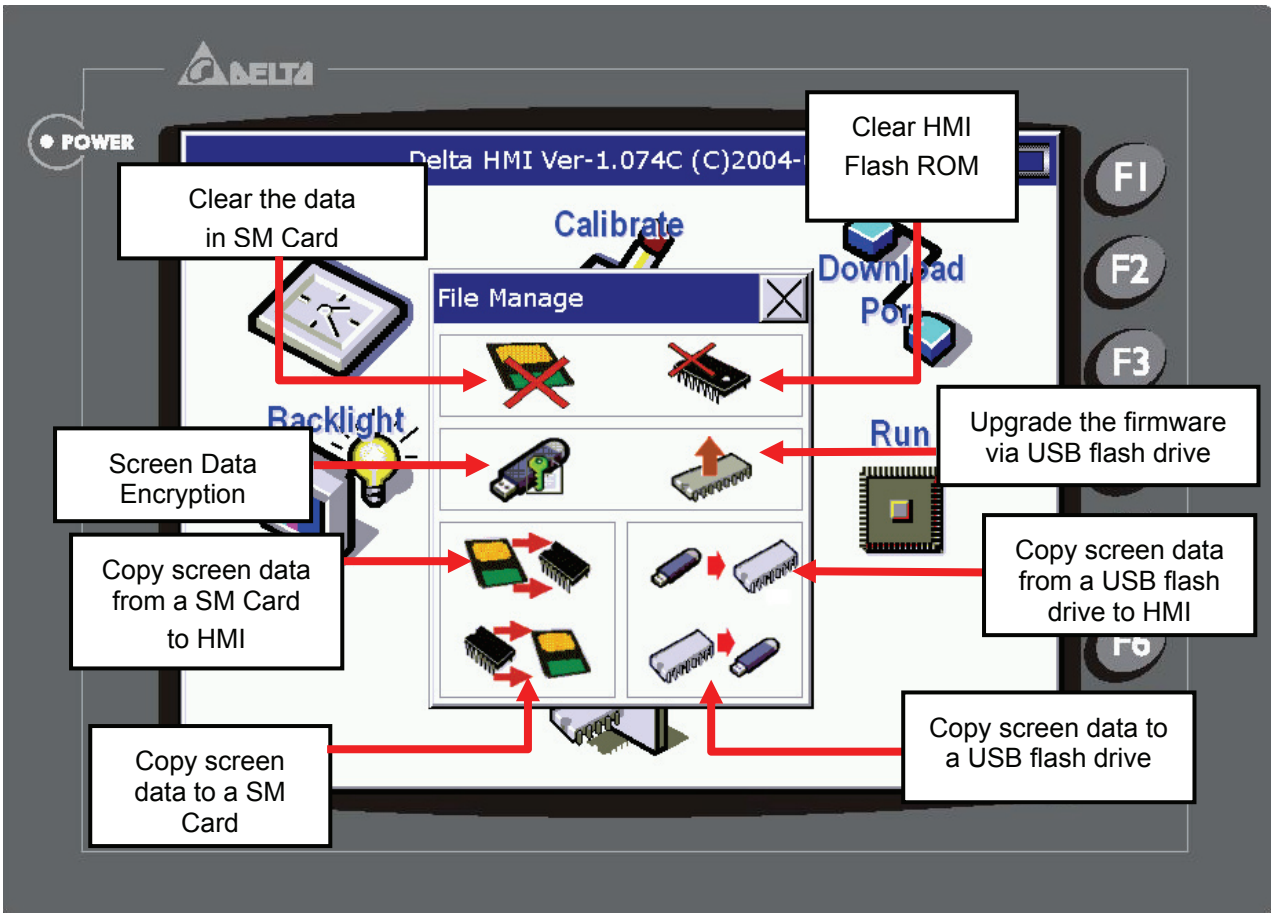


Fig. B.10

Data Encryption:

It is used to enable the screen data encryption function. When pressing this icon, one dialog box will pop up and ask if the user wants to encrypt SYS (system) file or not. Please refer to the figure below.



After the user press YES button, system will ask the user to set Copy Times. Please refer to the figure below.



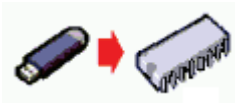
After Copy Times is set, the user needs to enter password which is set in ScrEdit software (**Options** > **Configuration** > **Standard** > **Security)**.



After entering the password, HMI will start to encrypt the screen data.





After screen data encryption is completed, the user can touch  to copy the data.

If the password is incorrect, the following warning dialog box will display to remind the user and the screen data cannot be encrypted.



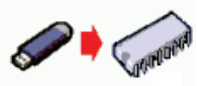
Upgrade Firmware:

The user can press this icon to upgrade the HMI firmware via USB flash drive immediately and compare the firmware version through the screen directly.

Please refer to the following figure.





	**Clear HMI Flash ROM:** Pressing this icon can clear HMI Flash ROM. Entering the password is needed when using this function.
	**Copy screen data from a USB flash drive to HMI:** Pressing this icon can copy the screen data from a USB flash drive to HMI.  

	The following warning dialog box will display if the Copy Times exceeds the setting value. 

No Encryption Mode

As shown as the Fig. B.11 on next page, when the user wants to use No Encryption mode, please do not check the box next to "**Enable USB updating check**" this option in **Options** > **Configuration** > **Standard.** Repeat the steps from Fig. B.2 to Fig. B.6 and then connect USB flash drive to HMI. After power in connected to HMI, power on HMI and a warning dialog box will display as shown as Fig. B.12 on next page.

This warning message is used to ask the user to boot from USB flash drive. When pressing Yes button, your screen will look like Fig. B.13. Pressing Yes button is to copy the screen from USB flash drive into HMI and the original screen data stored in HMI will be overwritten (Overwrite ROM File).

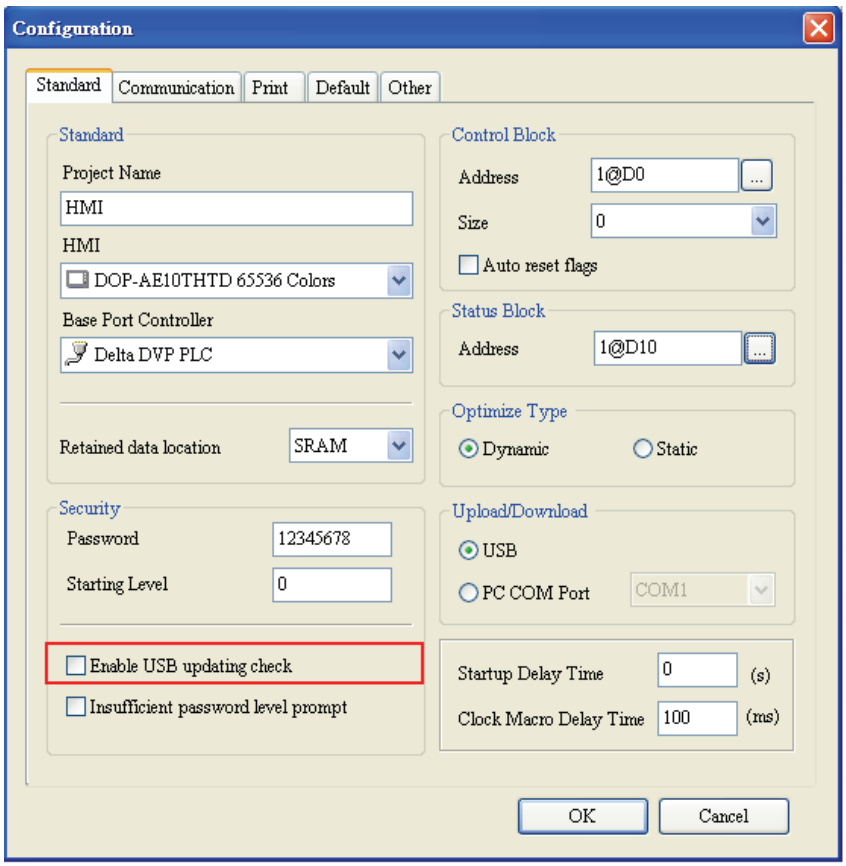


Fig. B.11



Fig. B.12



Fig. B.13

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Appendix C Main Menu Operation of HMI System

Pressing SYS (system) key on HMI panel for three seconds can enter into the main menu of HMI system (Fig. C.1). The user can change some settings and execute some function by touching the icons here.



Fig. C.1 Main Menu of HMI System

	**Date/Time Settings:** The user can touch this icon to change the date and time of Perpetual Calendar (RTC) of HMI. 



Calibrate Touch Panel:

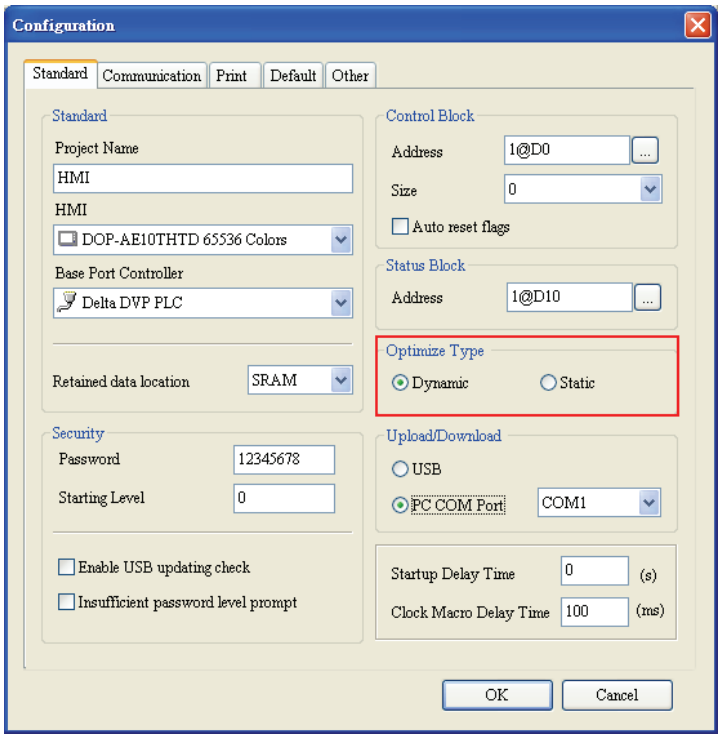
When the position of touch panel does not match the actual operation position, the user can use this function to calibrate the position of touch panel. When entering into Calibrate function, the user can find three front sight icons on the top-left, bottom-right, and the center of the screen. Please touch these three icons by turns to calibrate the touch panel.





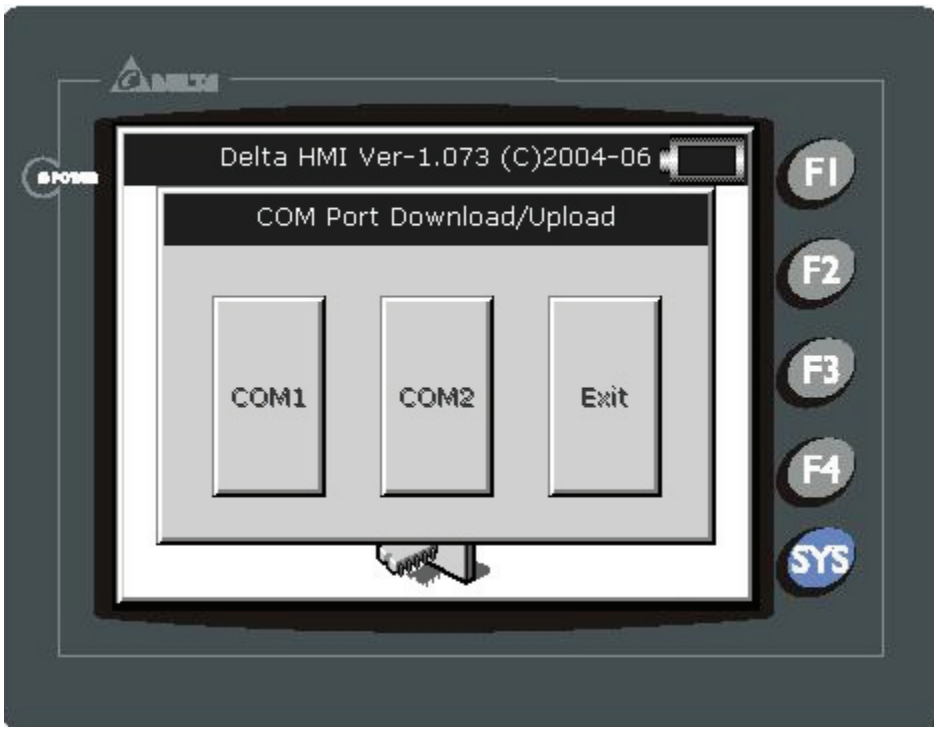
COM Port Upload and Download:

Besides USB flash drive, HMI also provide COM Port Upload and Download function. Before using this function, ensure to click **Options** > **Configuration** > **Standard** in ScrEdit software and choose PC COM Port to be the upload and download interface. Please refer to the figure below.



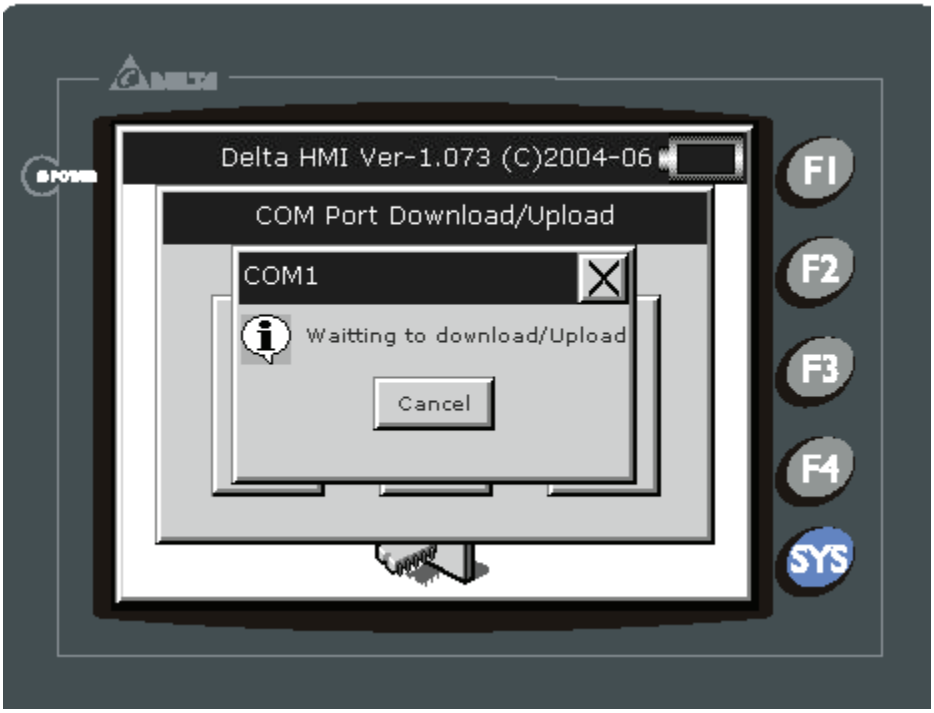


When touching **Download Port** icon on the screen, COM Port Download/ Upload dialog box will display and ask the user to select the desired COM port. After the user selects the COM port, HMI system will ask if Bypass mode is used or not. Please press NO and HMI will start to wait for the screen data which will be transferred by PC. At this time, the user can click **Tools** > **Download Screen** to download the screen data immediately.







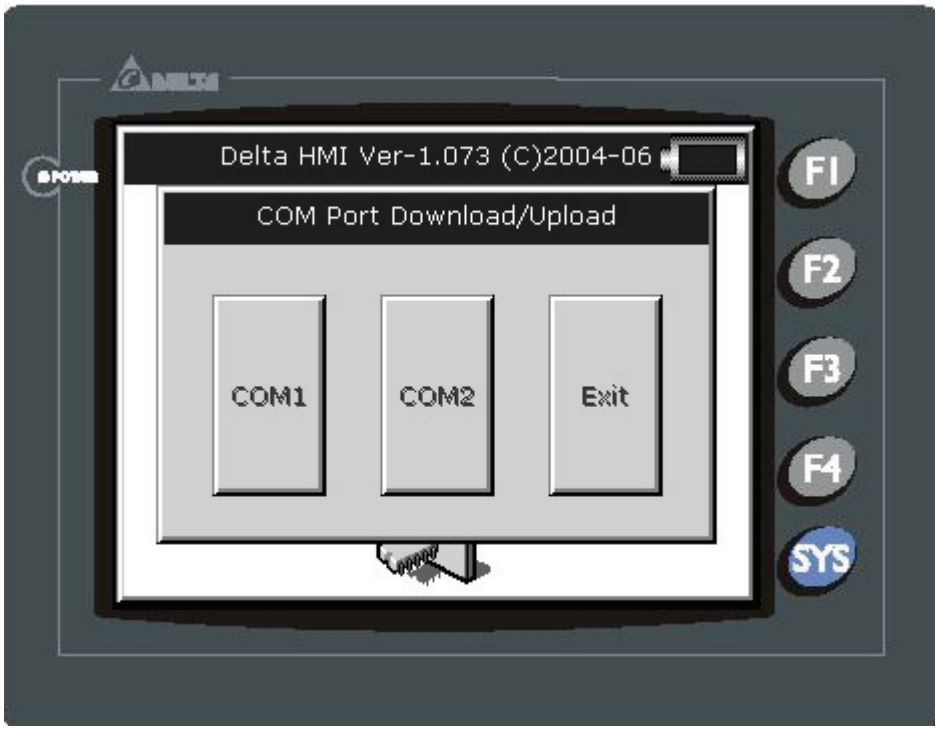


Bypass Mode:

Through Bypass mode, the data transferred by PC can be received by HMI COM ports directly and then be sent by another COM port of HMI. When planning the system, the user can use this function to update the program of the controller immediately. For example, when COM1 port of HMI is connecting to PLC, if the PLC program needs to be updated during operation, the user can select Bypass mode to transfer the new PLC program of PC to HMI via COM2 port of HMI and then download the new PLC program to PLC via COM1 port of HMI. The user does not need to remove PLC from PC.

When touching **Download Port** icon on the screen, COM Port Download/ Upload dialog box will display and ask the user to select the desired COM port. After the user selects the COM port, HMI system will ask if Bypass mode is used or not. Press Yes button and HMI will enter into Bypass mode. Press Cancel button is to exit Bypass mode.


Download
Port


Delta HMI Ver-1.073 (C)2004-06
COM Port Download/Upload
COM1
COM2
Exit
F1
F2
F3
F4
SYS


Delta HMI Ver-1.073 (C)2004-06
COM Port Download/Upload
Com Port
Bypass Mode ?
YES
NO
F1
F2
F3
F4
SYS







Screen Parameter Settings:

Touching **Backlight** icon change the screen parameter settings. Please refer to the following table.

	Contrast
	Brightness
	Frequency



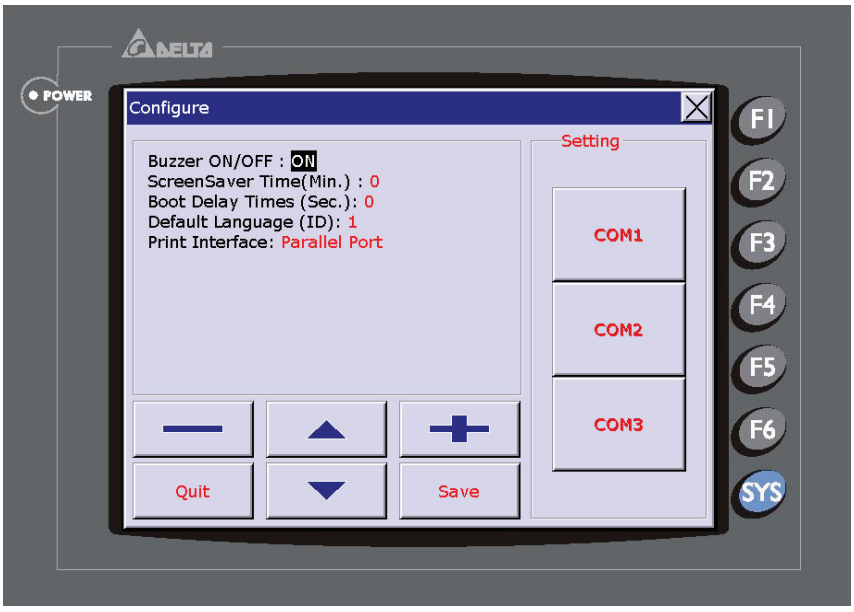


System Parameter Settings:

It is used to set system parameter and communication settings.

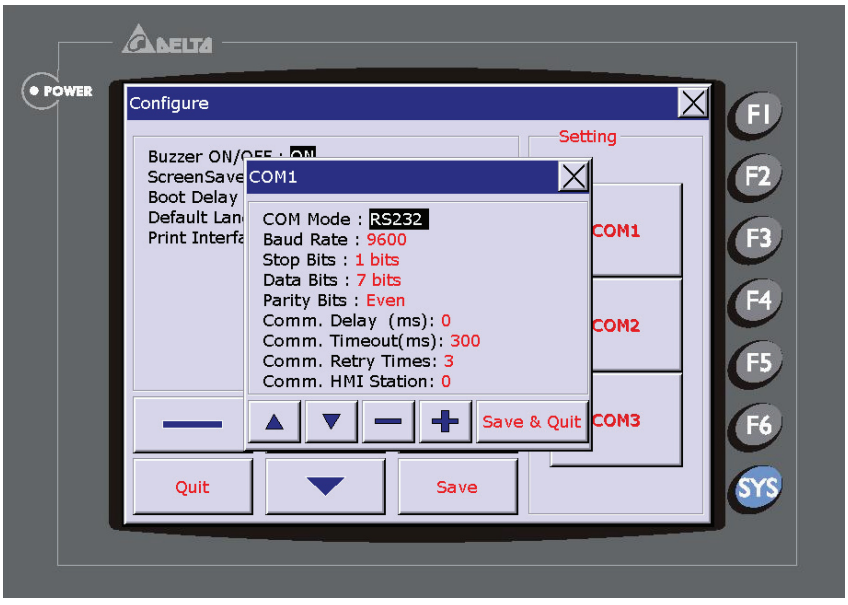
System Parameters

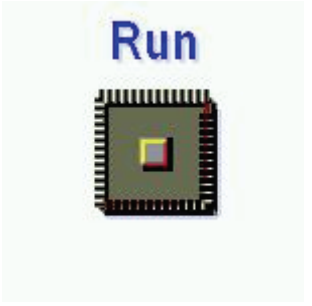
Buzzer ON/OFF	Set if Buzzer works or not.
ScreenSaver Time(Min)	Set how long it waits before going into screensaver after HMI is used. The unit is minute.
Boot Delay Times(Sec)	Set how long it delays before enabling HMI program after the power is in connected to HMI. The unit is seconds.
Default Language(ID)	Set the default language when multi-language function is used.
Print Interface	Set the connecting print interface. It can be USB or Parallel Port.



Communication Parameters

It is used to set communication parameters of each COM port.





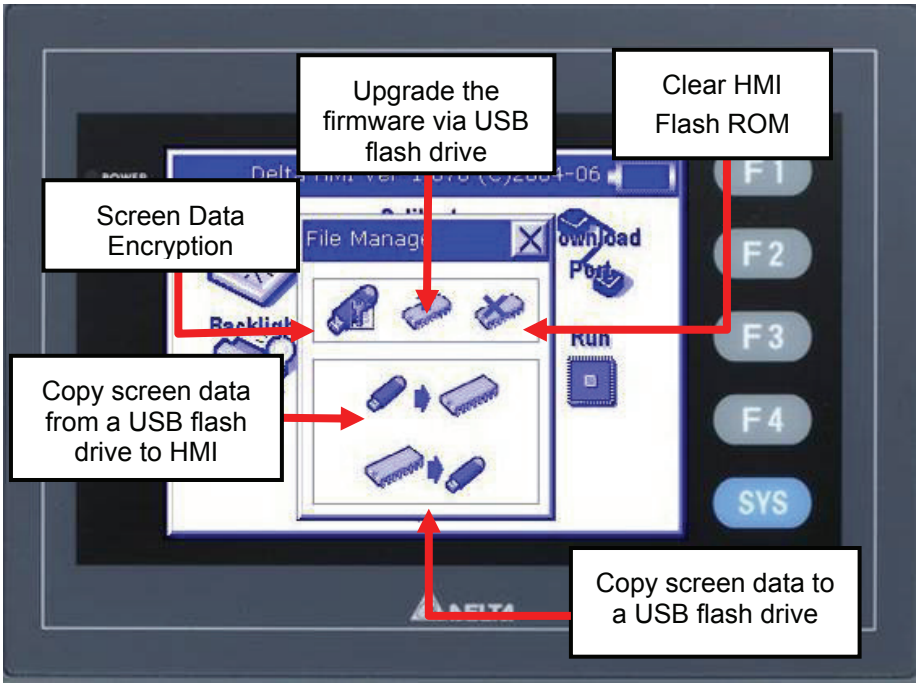
Run HMI:

Touching RUN button to run HMI.

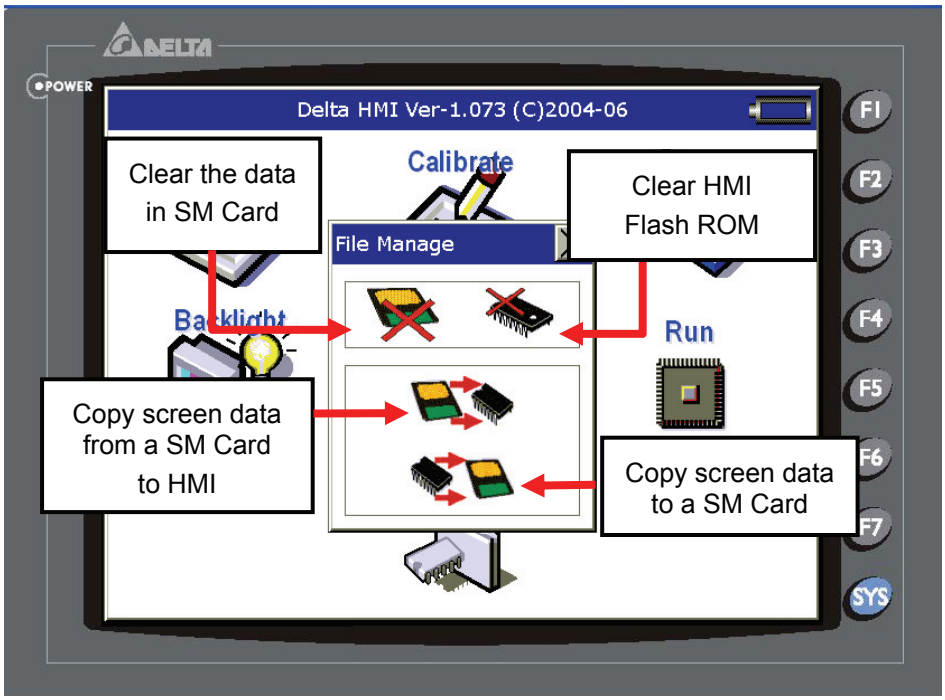


File Manager:

AS Series

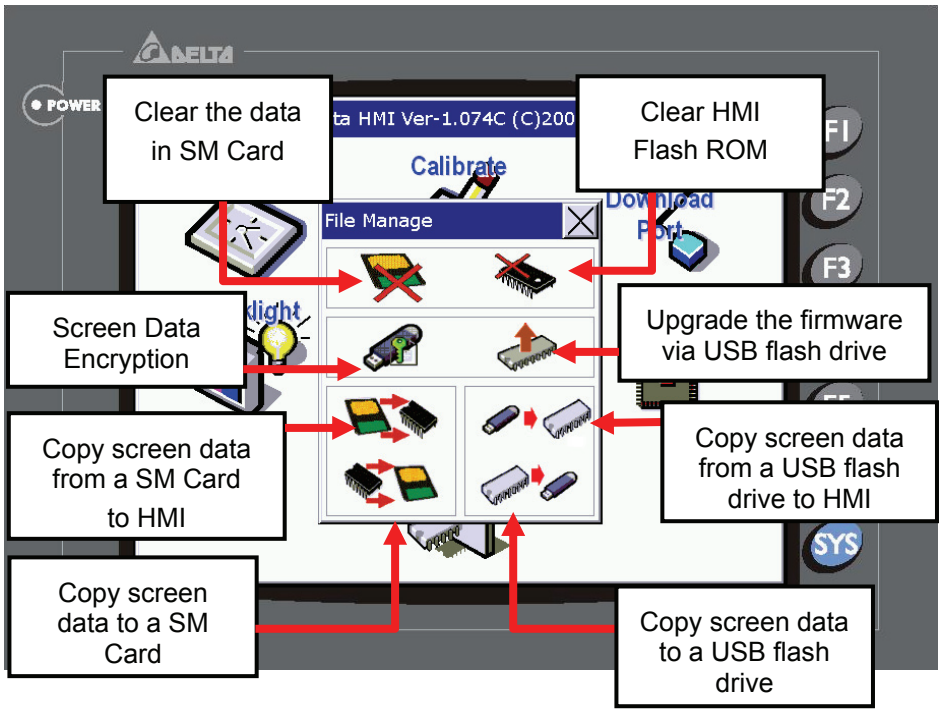


A Series





AE Series



For the description of USB Flash Drive Function, please refer to Appendix B.

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